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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

1924

Development of the Maxilla—*Federspiel*

Economic Problem—*Johnson*

Cysts and Tumors—*Dunning*

Wetting in Bacteriology—*Larson*

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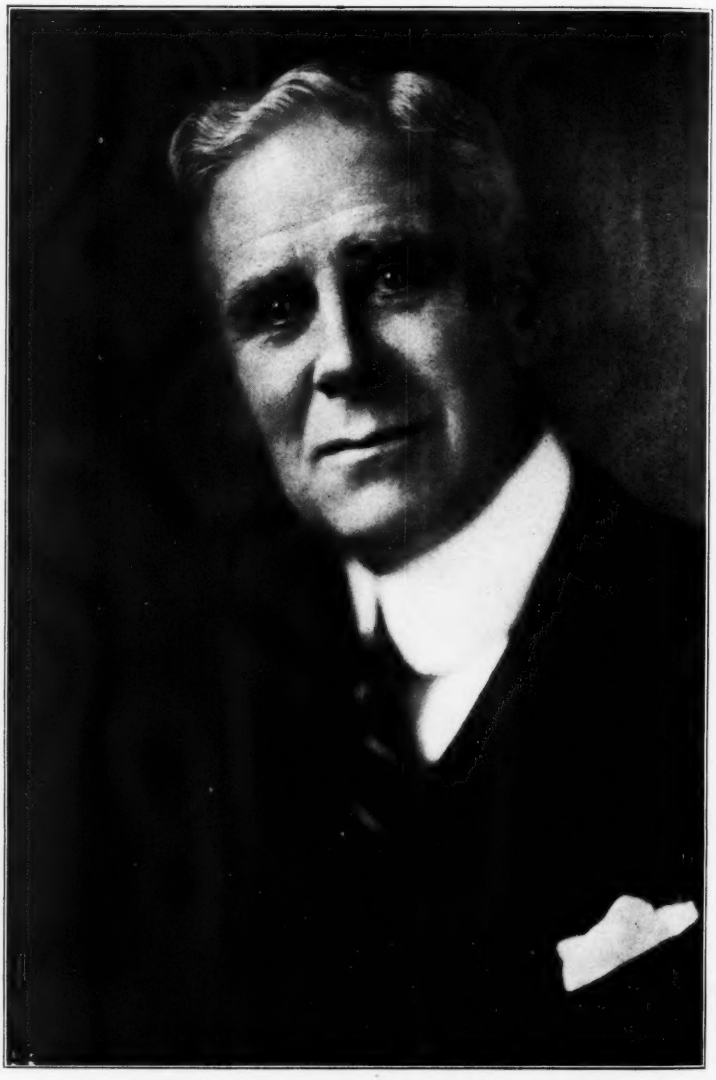

THOMAS J. BARRETT, M.A., D.D.S., F.A.C.D.

President of The Dental Educational Council of America, and Member of the Council for the Last Ten Years

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Original Communications

SOME OBSERVATIONS IN THE DEVELOPMENT OF THE MAXILLA IN CLEFT PALATE CASES

By M. N. FEDERSPIEL, B.S., D.D.S., M.D., F.A.C.S., Milwaukee, Wisconsin

(Read before The American Society of Orthodontists, Chicago, Illinois, April 9-11, 1923)

THE first synopsis of the development of the external form of the human body is given by W. His in his "Anatomie Menschlicher Embyronen" 1880—1885. Since that time the literature on human embryology has become quite voluminous. It is unnecessary here to discuss the development of the human body other than the mouth.

The examination of a human embryo a little over 2 mm. in length will reveal upon the ventral surface, in front of the yolk sac a round protrusion, the heart, and in front and above a depression, the oral sinus. The anterior boundary of the oral sinus is formed by the projecting frontal extremity of the brain. The sides of the oral sinus are formed by the maxillary and mandibular processes.

In human embryos of 8 mm., at about the fifth week, the nasal cavity is still a part of the oral sinus. At about the beginning of the seventh week there is a change taking place in the anterior boundary which becomes concave, the lateral surface forming in a thickened elevation called the processus globularis. (Fig. 1.)

On each side of the processus globularis there is developing a thickened outgrowth from the frontonasal process called the external nasal process, which forms the alanasi and the soft tissue adjoining.

The globular processus and the maxillary process unite to form the nasal pits. The growth is toward the center until they meet to unite and the anterior of the mouth is complete. The globular

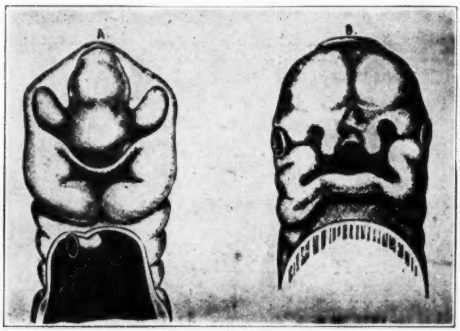

Fig. 1.—(*a*) Head of fetus, of about five weeks, from ventral aspect, showing the primitive stomodeum bounded above by the undivided frontonasal process, laterally by the maxillary, and below by the still separate mandibular processes. (*b*) Head of fetus from ventral aspect of a little later date (6 to 7 weeks). The mandibular processes have united, and the frontonasal process has developed into external and internal nasal processes around the nasal fossae. (After His.)

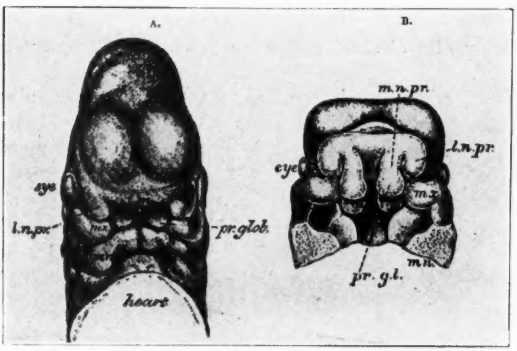

Fig. 2

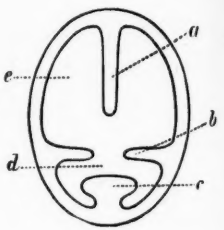

Fig. 3

Fig. 2.—(*a*) Head of fetus at a somewhat later date (8 weeks) as seen from the front, showing the nasal and maxillary processes in close apposition, and the clefts between them diminishing in size. (*b*) The same, seen from below, the mandibular process having been removed.

im, Central portion of frontonasal process; *m*, *n*. *pr*. internal nasal process; *pr*, *gl*, globular process; *l*, *n*, *pr*, external nasal process; *m*, *n*, mandibular process. (After His.)

Fig. 3.—Diagrammatic presentation of the development of the palatal processes and of the ethmovomerine plate seen in vertical section. (After Gegenbaur.)

a, Ethmovomerine plate; *b*, palate processes; *c*, tongue; *d*, buccal cavity; *e*, nasal cavity.

processes, when united, form the central portion of the upper lip called the philtrum, and below the lip is formed the inner segments of the intermaxilla called the endognathion; above the philtrum is developed the prominence of the nose growing from the medium portion of the frontonasal process.

From the deeper aspect of the external nasal process the mesognathion is formed to unite with the endognathion, thus forming the intermaxilla.

About a week after the buccopharyngeal membrane disappears, the mandibular arch is formed on either side, forming the lateral and lower boundaries of the oral cavity. Each side grows forward to meet its fellow in the middle line, thus forming the mandible and the tissues covering it. (Fig. 2.)

The mouth and nose at this time still remain one cavity; the roof is the base of the skull.

At about the seventh week there is an outgrowth from the deep aspect of each maxillary process of the horizontal plates, which when united form the hard and soft palate; these unite with the endognathion and mesognathion of the frontonasal process thus dividing the nasal and buccal cavities.

The nasal cavity is divided into lateral halves by the downward growth of the deeper aspect of the frontonasal process of a central vertical septum, to become in time the cartilaginous septum nasi, and the long ethmovomerine plate uniting at its lower border with the horizontal plates of the maxillary process and the median line of the intermaxilla. (Fig. 3.)

Failure of union of the various parts that make up the lip, the premaxillary bone, and the palate will produce a cleft. Union of the individual process begins in front and proceeds backward; therefore, if the process which forms the lip should fail to unite while the processes which form the intermaxilla and palate should unite, the result would be a cleft of the lip and a normal intermaxilla and palate. (Fig. 4.)

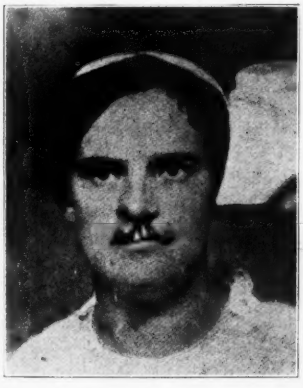

Fig. 4.—A cleft of the lip and a normal intermaxilla.

Fig. 5.—A cleft palate.

If the processes which form the lip should unite while the processes which form the intermaxilla and palate fail to unite, the result will be a normal lip

Fig. 6.—A complete harelip and cleft palate.

with a cleft involving the palate and alveolus. (Fig. 5.) If the processes which form the lip, intermaxilla and palate should fail to unite, the result is a complete harelip and cleft palate. (Fig. 6.) If the two globular processes fail to unite, the result would be a median cleft of the lip. (Fig. 7.) If the two mandibular processes should fail to unite, the result would be a cleft of the lower lip, and may involve the mandible. (Fig. 8.) If there is an imperfect development in the connection between the maxillary and mandibular processes from which the cheeks are developed, the result will be a large rimaoris, which may resemble a cleft in the cheek called macrostoma. (Fig. 9.)

Fig. 8.—A cleft of the lower lip.

Fig. 7.—A median cleft of the lip.(After Rose.)

Fig. 9.—Macrostoma, showing the cleft in the cheek prolonged upward and backward by a reddish cicatrix to a lateral loss of substance of the cranial wall. (Sutton.)

If there is a failure of union between the maxillary and the internal nasal processes. the result is a facial cleft.

(Fig. 10.) Should there be a failure of union between all of the processes

Fig. 10.—Facial cleft. (After Rose.)

that go to form the oral nasal cavity, the result would be not only a shocking,

Fig. 11.—The result from a failure of all of the processes to unite that form the nose, mouth and surrounding structures. (Delafield and Prudden.)

but a hideous deformity, which might be called a monstrosity. (Fig. 11.)

In the study of the development of the various forms of cleft that may be produced on account of the various processes not uniting, one can appreciate that a cleft may be a mere notch, or so extensive as to involve one or all the fissures.

However, in this paper we are concerned only with the cleft of the lip and cleft of the alveolus and the palate. As I have shown above, the intermaxilla is formed from two centers on each side, the endognathion and mesognathion, and these centers when united form a

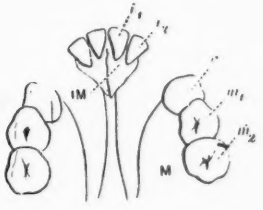

Fig. 12.—Diagram presenting the old or "Goethe" theory of alveolar harelip, indicating both central and lateral incisors as developed from one intermaxilla on either side, and the alveolar cleft between the maxilla and intermaxilla.

M, Maxilla; *IM*, intermaxilla; i_1, central incisor; i_2, lateral incisor; *c*, canine; m_1, first molar; m_2, second molar.

separate bone which later becomes united with the horizontal processes of the maxilla.

Dr. Robert Nesbit in 1736 was probably the first actually to discover that the intermaxilla was a separate bone which later became united with the maxilla. However, as far back as in the time of Galen the intermaxilla was found to be a separate bone in the apes and lower animals.

Goethe in 1779 demonstrated the extent of the intermaxilla in the human fetus, and as the outcome of this discovery reported his belief that a cleft of the alveolus could only occur at the maxillo-intermaxilla suture, i.e., between the lateral incisor tooth and the canine. (Fig. 12.) This belief was handed down until Albrecht in about

1879, and in a number of papers after that time, demonstrated that the intermaxilla is not developed *en masse,* but

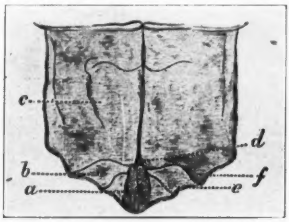

Fig. 13.—Bony palate of a fetus of six months, showing the development of the intermaxilla in four portions.

A, Endognathion; *b,* mesognathion; *c,* exognathion; *d,* anterior palatine canal; *e,* endomesognathic suture; *f,* exomesognathic suture. (After Gilis.)

is formed by the union of four segments, two on each side. (Fig. 13.)

Since that time embryologists have conclusively proved that the intermaxillary bone is developed from four centers, to unite later with the maxilla proper. As I have said before, if failure of any of these centers to unite occurs, a cleft will exist. Goethe and his followers have believed that a cleft of the alveolus will be between the intermaxilla and the maxilla. Albrecht and his followers have demonstrated that the cleft of the alveolus will extend between the endognathion and the mesognathion.

During the formation of the intermaxilla and maxilla in embryo at about the fortieth day, at the location where the alveolar process develops, there appears an ingrowth of epithelium, which extends deeply into the mesoblastic tissue. At each point where the tooth is going to be formed, a bell-shaped thickness appears at about the forty-eighth day, or about the seventh week. It is interesting to know that about that time the union of the endo-, meso-, and exognathion should be united. If the mesognathion is delayed in its formation, the exognathion and endognathion may grow toward each other and prevent the full development of the mesognathion. The result is that the epithelial

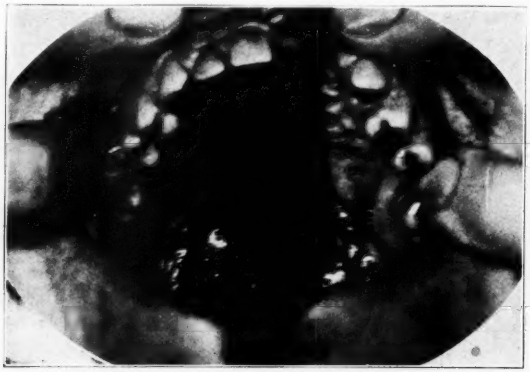

Fig. 14.—A cleft caused by the endognathion and the mesognathion on one side missing.

thickness to form a lateral tooth will be retarded, or arrested in its growth, or it may be obliterated.

In my clinical experience in cleft palate cases, I have observed that the

cleft of the alveolus is usually between the endo-, and mesognathion, that the cleft is not only due to a failure of dognathion and the mesognathion structures may be missing, leaving a large alveolar cleft. (Fig. 14).

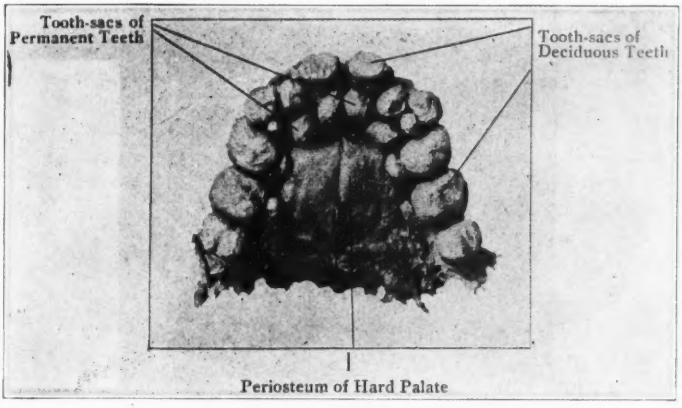

Fig. 15.—Tooth follicles for deciduous and permanent teeth, three months after birth. (After Broomell.)

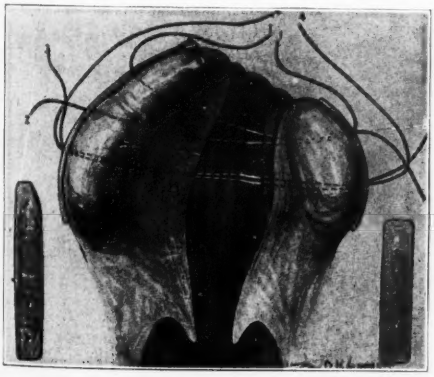

Fig. 16.—Wires and plates in position. The method of fastening the wires is shown by numbering each end. Right and left lead plates are shown. (After Brophy.)

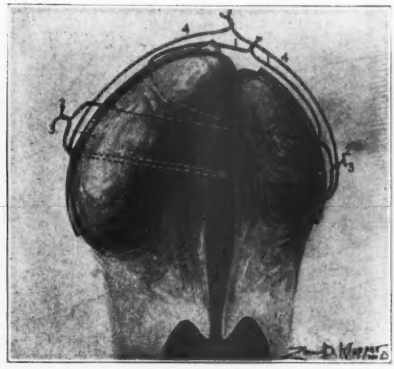

Fig. 17.—Twisting of the wires completed. (After Brophy.)

union, but also on account of the mesognathion having failed to develop. In such cases there is always a lateral tooth missing. Accordingly the en-

It is interesting also to note that at birth the tooth buds have developed deeply in the mesoblastic tissue, so that only a thin plate of bone separates the

alveolar cavities from the orbit. The antrum at this time does not as yet exist. In correspondence with the elongation with the tooth sacs the alveoli become increased in depth. Combined with a general interstitial growth, the antrum begins to form. Any loss of tooth germs during this period will greatly interfere with normal jaw growth.

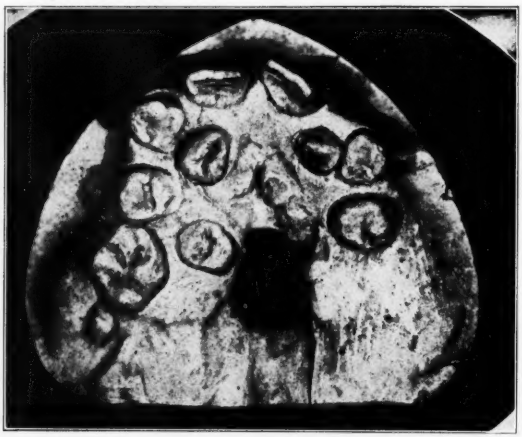

Fig. 18.—Result after an attempt to close a cleft by passing wire ligature through the jaw; notice loss of permanent teeth and malposition of the teeth.

Figure 15 illustrates the position of the tooth follicles three months after birth. Any injury to the tooth buds at this time may not only destroy them, but also displace the teeth from the normal path of eruption. This is especially true in cleft palate cases if an attempt is made to pass wire ligature through the alveoli after the Brophy method. (Figs. 16 and 17.) The trauma produced by these wires will usually destroy some of the tooth buds, or shift the tooth buds from the normal position in the mesoblastic tissue. Figures 18 and 19 show some striking cases where some of the teeth have been destroyed and missing, with a general malrelation of the teeth and undeveloped arches, which was brought about by passing wire ligature through the alveolar process in an attempt to close the alveolar cleft.

I always recommend that practitioners who are present at the birth of a child with a harelip should see to it that the borders of the cleft are held together, or nearly so, with adhesive tape. The chief reason for this preoperative care is that the pressure brought about by the adhesive tape will greatly assist in molding the lip so that the fissure becomes narrower. In patients who have a cleft of the lip and alveolar process such treatment often aids in reducing not only the width of the lip cleft, but also narrows the cleft of the alveolar process. When one observes a child with a harelip crying or laughing the sphincter-like action of the orbicularis oris muscle cannot functionate normally, so that when contraction occurs each half of the lip pulls away from the center, and therefore exaggerates the deformity. If, however,

the borders of the lip are held together with adhesive tape, the child in the act of crying or laughing will fail to widen the preoperative care is of great importance to the surgeon in obtaining a better cosmetic result.

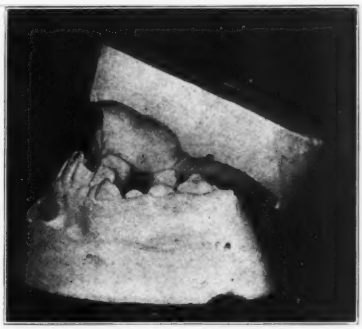

Fig. 19.—Showing undeveloped upper jaw from loss of teeth due to passing silver wires through jaw in infancy for repair of cleft palate.

and evert the edges of the cleft. The tendency then will, by muscular pull, cause the cleft of the lip and alveolar process to become more narrow during the growth of the child. (Figs. 20 and 21.) The narrowing of a cleft during

Fig. 20.—This patient was strapped with adhesive tape in order to reduce the width of the cleft.

In cases that have a complete cleft of the lip and alveolar process and palate, some surgeons recommend the closing of the alveolar cleft first and then at a later time the cleft of the lip, especially so if the Brophy operation is to be performed, as the surgeon has better access to the palate. However, I have abandoned, in most cases, this

Fig. 21.—The same patient after the borders of the cleft were united.

method for the reason that after the cleft of the lip is closed the sphincter-like action of the orbicularis muscle will usually mold the alveolar cleft so that its borders approximate, and in some cases closure takes place. In such cases after the cleft of the lip and alveolar process are united I close the palatal cleft several months later. At no time, in closing the hard and soft palate, have I found any difficulty, arising from a previous operation on the lip.

That the intermaxilla is developed from four centers—two sections of endognathion and two sections of mesognathion—is now an established and recognized fact. Therefore, one is justified in recognizing the intermaxilla as a distinct bone subject to anatomic and pathologic changes during growth. Delayed calcification and union with the lateral halves of the horizontal plates of the maxilla will determine its shape and position later in life.

Sucking the thumb in infancy will stretch the bone in an anterior posterior line, carrying with it the four incisors which if protruding beyond the normal line of occlusion will permit the vermillion border of the inferior orbicularis oris muscle to rest against the lingual surface of the intermaxillary teeth.

This malrelation of the lower lip will, through muscular action, force the teeth anteriorly so that labioversion of the teeth with elongation of the intermaxilla may be so excessive as to prohibit normal development of the upper

Fig. 22

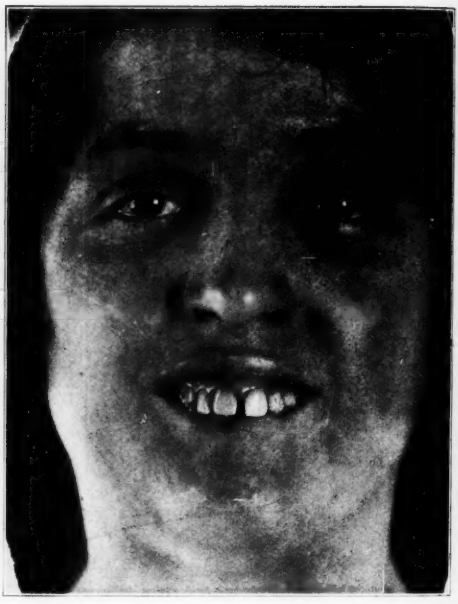

Fig. 23

Figs. 22 and 23.—Elongation of the premaxillary bone with labioversion of the anterior teeth.

lip. This abnormal development of the intermaxilla and protruding incisors may likewise be established from nasal stenosis. Enlarged adenoids in the unborn and in infants, if not removed will promptly disturb the normal balance of jaw growth.

Fig. 24

Fig. 25

Figs. 24 and 25.—The result after partial resection of the premaxillary bone and extraction of the anterior teeth.

The contour of the face is largely influenced by the muscles which move the jaws. Thus, when nasal stenosis exists from any pathologic manifestation, such as enlarged tonsils, adenoids, deflected septum or hypertrophy of the adenoids, the powerful muscles which close the jaw, the masseters, temporals and internal pterygoids, remain usually inactive, and become weakened and subject to atrophic changes; while the muscles that open the mouth, the digastric, mylohyoid and geniohyoid and the platysma, become more active in holding the mouth open. Then if such a condition exists in early childhood, especially at the time when the glenoid cavity is nearly flat, with no well-marked surrounding elevations, the mandible is not only held down, but the muscles are usually active in shifting the mandible backward and preventing its free growth forward. Naturally, if such abnormal action of the jaw muscles remains over a number of years during growth, the shape of the mandible may not only be an obtuse angle, but undeveloped; or it may be displaced in retroversion.

I am satisfied that delayed closure of the intermaxillary suture, accompanied by thumb sucking and lower lip pressure, is responsible for the elongation of the intermaxillary bone and labioversion of the incisors.

I have come to the conclusion that in the development of the maxilla there is a great tendency for an anteroposterior elongation, but this elongation takes place almost entirely in the intermaxillary bones, and is much greater in the orang-outang and the gorilla than in the chimpanzee. The reason for this is that the intermaxillary suture closes much earlier in the chimpanzee than the other two genera of anthropoid apes. The prognathism that we find in anthropoid apes is because of the long continued growth of the intermaxilla, and from my observation I am quite satisfied now that the prognathism of the lower races of mankind is because the obliteration of the suture takes place later than in the modern man.

A very interesting case of anteroposterior elongation is illustrated in Figs. 22 and 23. Miss M., aged 23, in good general health, occupied in clerical work, reported to our clinic about two years ago. On examination we found that she had a typical elongation and overdevelopment of the intermaxillary bone with a pronounced labioversion of the maxillary incisors. There was no pathologic condition involving the nasal and pharyngeal area, and her breathing through the nose was free and easy. The mandible showed the usual development.

Fig. 26

Fig. 27

Figs. 26 and 27.—Lips held slightly apart showing the artificial teeth; notice improvement of facial outline and compare it with Figs. 22 and 23.

If the diagnosis were made from the position of the incline planes of the teeth according to the antiquated, obsolete and numerical classification, this case still would have to be treated by bringing the mandibular arch and teeth forward, widening the maxillary arch, and retracting the maxillary anterior teeth. Many of us, no doubt, have attempted this form of treatment, which gives splendid results when applied rightly and carefully during the developmental period, but to attempt such treatment without extracting, in a case of this kind, would bring results about as positive and satisfactory as the Coué treatment in his "day by day in every way I am getting better and better."

As I said before, this patient came to us about two years ago to have this pronounced deformity corrected by orthodontic methods. Unfortunately we found that the patient had lost a large number of posterior teeth, and most of her remaining teeth were undergoing gingivopericementitis. We informed her that in our judgment orthodontic treatment would be contraindicated, as her teeth were undergoing a progressive suppurative pericementitis. Therefore, we advised the complete removal of all her maxillary teeth and partial resection of the premaxillary bone to be done subperiosteally, followed by the fitting of an artificial upper denture. It took her just one year to make up her mind to undergo such an extreme and radical operation, but when she fully understood that she was not only suffering from a deformity, but an infectious process which was undermining her health, she was ready to comply with our advice. The operation was done, and in less than one month healing had taken place, and the lost teeth restored with an

Fig. 28

Fig. 29

Figs. 28 and 29.—A marked elongation of the premaxillary bone and labioversion of the teeth.

upper denture. I want to call your attention to the marked improvement in her facial outline. (Figs. 24, 25, 26, 27.) It was very difficult for her to bring her lips together, and if she did so they were under a tension. Now her lip function is free and easy, and the lips come together without any effort on her part.

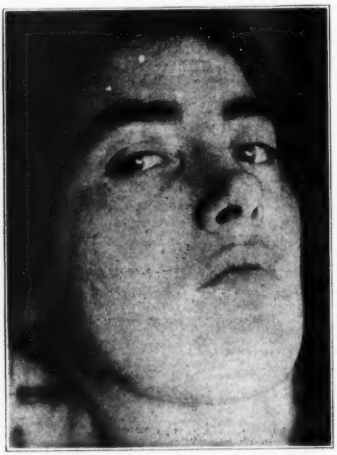

Fig. 30.—Result after operation and restoration of artificial teeth.

Another case, similar to the one I have just described, is shown in Fig. 28. This patient had a marked elongation of the intermaxilla with protruding maxillary incisors. (Fig. 29.) In this case the mandible and the mandibular arch apparently are of normal size. The alveolar process surrounding the incisor teeth was overdeveloped to such an extent that the patient found it difficult to close the lips. There was also a marked gingivo-pericementitis involving these teeth. In this case we found that in order to improve the patient's facial outline, and to improve her forces of mastication and normal lip function, a surgical operation for the removal of the incisors and cutting out the protruding mass of the alveolar process with subsequent restoration of artificial teeth was necessary. This was done, and Fig. 30 shows the result after the operation. Notice the lips resting together with the natural wrinkling that should take place in a normal lip. This patient gives the information that she sucked her thumb when a child. Undoubtedly the pressure from the thumb sucking during the developmental period stimulated the intermaxillary bone to elongate.

Discussion

Dr. Kelsey, Baltimore, Maryland: I have found one or two cases of the palate, one in particular in which a lateral incisor was on the distal side of the cleft. That was some time ago, and it was rather confusing under the old theory that the cleft always occurred between the maxillary and premaxillary bones.

Under the explanation that Dr. Federspiel has given us, it seems the most natural thing in the world. With regard to the other phases of Dr. Federspiel's work which I might discuss more intelligently, I want to say that in no sense do I criticize his statements regarding the possible development or overdevelopment of the premaxillary bone, but I feel that possibly the analogy he has drawn between man and the lower man and the anthropoid apes may not be so well founded.

The elongation of the intermaxillary bones in the jaws of apes is a normal condition, and one that occurs regularly as a normal process of development. The size of the teeth and the shape and size of the jaws determine this. The length of the intermaxilla in the primitive races of man is also quite normal, and it does not seem to me that these conditions can be compared to the abnormal development of this bone in civilized man. Compared with the normal development of civilized man they certainly show striking differences, but in all three the length of the intermaxillary bones, the inclination of the teeth and the size and shape of the dental arches and their relation to the rest of the face and head are characteristics of the race or species, and I hardly feel that we can say the prognathus or protruded appearance of the denture in primitive man or

the anthropoid apes is due to the sutures remaining open longer than in civilized man.

There are many other factors which enter into the particular anatomy of any race or species. I do believe, however, that any influence which might tend to retard the union of the sutures in civilized man might readily have a tendency to overdevelopment of the intermaxilla which would easily give the appearance of protrusion to at least the maxillary anterior teeth. If one could know that this had taken place in a given case, it would unquestionably influence him in his decision concerning treatment.

With reference to treatment in adult cases in which a pronounced protrusion of the upper jaw and teeth is in evidence, I think very highly of the methods and results in the cases cited by Dr. Federspiel. But I am also convinced that cases at this age are capable of rational orthodontic treatment, provided the teeth are in themselves healthy and present in sufficient number to stimulate through pressure applied to them the bone in which they are implanted. I do not say that in many instances with the adult it is not the wiser plan to remove two deciduous molars and retract the teeth anterior to them. I have, however, secured good results in one or two instances without extracting. The period of retention is very long, however, and I am inclined to think that in most cases recurrence is sure to take place, because in the adult the correction of the distal occlusion is usually due to a forward movement of the mandible and not so much to a new and further development of it.

Grünberg called attention to the tendency toward recurrence of distal occlusion in adults, in a paper before the Alumni Society of the Angle School, illustrating his remarks by slides of a case in which he not only corrected the distal occlusion, but put in pronounced prosthetic restorations to aid in guarding against a recurrence. The occlusion was maintained, but after two or three years the jaw had slid back toward its original position. In other words, the alveolus had slid forward on the mandible, or had been gradually absorbed and rebuilt in a new and more anterior position upon the mandible, leaving the profile lines of the face, which had been beautifully corrected, about the same as they were originally. This, and my own experience, would seem to confirm Dr. Federspiel's assertion that in the adult the correction of distal occlusion is chiefly by the patient assuming a more anterior position of the mandible in relation to the maxillary thus bringing the condyles forward in the fossa, and that all the forces which operate upon the mandible tend to bring it back gradually.

The muscles and all the soft tissues of the face which have for so long accommodated themselves to the abnormal position of the mandible will for a long period tend to draw it back into that same old position, so that such cases in adults have to be watched almost indefinitely.

The accommodation of the muscles and soft tissues in children comes about very much more quickly, because they are still in a growing state and may be induced to grow normally just as well as abnormally, while in the adult it is a case of correcting an abnormal growth and producing often a secondary alveolus, yet in so far as function can be established and maintained, just so far will treatment be successful in adults, and this is often considerable.

Regarding the muscular mechanism which produces the distal occlusion in adenoid mouth breathers, I have evidence to support Dr. Federspiel's theory in an article I read before the Laryngological Section of the Maryland Medical and Chirurgical Faculty several years ago, and from which I quote: "I have stated that cases belonging to this class are practically always due to adenoids, and I believe this to be true because of their anatomic position in the respiratory tract in the following manner: as they increase in size, the space above and back of the soft palate is diminished until nasal breathing is no longer possible and mouth breathing is fully established, which means, of course, that instead of the teeth being in occlusion, as is natural during the usual periods of repose, they are separated, the mouth being open to breathe, and the influence of the normal relation of the inclined planes of the teeth upon each other is lost. The muscles of expression and mastication are also functionally perverted, and the influence of the tongue (the normal counterbalance to the external muscular pressure) is reduced to the minimum, as it no longer fills the oral cavity in which it is ordinarily sustained when the lips are in normal contact by exclusion of the air, a slight partial vacuum being formed between it and the posterior portion of the

palate. Not only is the tongue not sustained in the roof of the mouth, but it is actually depressed and maintained in that position to relieve it from contact with the soft palate, which cannot be raised as when the pharyngeal tonsil is normal. To accommodate this depressed position of the tongue and aid in maintaining a free opening for air, the contraction of the mylohyoid and geniohyoid muscles above, and the sternohyoid and omohyoid muscles below takes place, which opens the throat and straightens out the angle between the body of the jaw and the neck, as may readily be observed in anyone, and becomes in the class of deformities under consideration a distinguishing diagnostic symptom. The contraction of the muscles forming the floor of the mouth (the mylohyoid and geniohyoid) also reacts upon the jaw in a tendency to draw it distally, and in the young subject its influence is soon marked by distal occlusion of the teeth when the jaws are closed, as occurs in these cases only in mastication and swallowing. I do not mean to say that the lower jaw is actually drawn very much distally, but it is to an appreciable extent, and this, together with its retarded development, is sufficient to permit the inclined planes of the erupting molars to engage distal to normal, after which every closure of the jaws in mastication tends to slide them into complete distal occlusion, after which it is rare indeed that the jaws regain their normal relations without aid, even though the adenoids have been removed and normal breathing resumed. Imagine these conditions obtaining for a considerable period of time at any stage in the child's development, and it is easy to see how he will grow into the deformity."

THE ECONOMIC PROBLEM—HOW SHALL DENTISTS MEET IT?

By C. N. JOHNSON, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D., Chicago, Illinois

(Read before the First District Dental Society of Michigan, January 10, 1924)

TWO different considerations present themselves the moment one begins to think of this subject: the necessity of providing adequate means for maintenance through life to old age, with ample provision for those who by the ties of Nature are dependent on us, and doing this in an ethical and equitable manner. Some dentists seem to assume that it is a very difficult matter to accomplish this, and are apparently unable to harmonize financial success with the highest ethical standards. There has evidently grown up in the professional mind a conviction that to be a success financially in dentistry one must sacrifice one's professional instincts and be a money-grubber pure and simple. "How erroneous this is may be gathered by a study of the facts in the case, and an observation of the records of many men in the profession who have been successful financially and at the same time of unquestioned ethical preeminence. By this it is not meant that dentists are in a position to amass large fortunes which run into the millions—their calling does not in the nature of things contribute to this—but that there is nothing incongruous in a dentist accumulating ample means for his own needs and for those of his family, while enjoying the greatest professional respect.

As a matter of fact, there is a moral obligation incumbent on every professional man to so direct his affairs, and so husband his resources, that he may approach old age, or face any of the exigencies of life, with the calm assurance that he need not worry about his maintenance, or be in any way an object of charity. How bitter the dregs of many of our elderly professional men are can be realized only by those who have been brought into close personal relationship with them. There is no more pitiable a spectacle in professional life than to see a man who has followed his calling for nearly or quite half a century, and who at the end of all of his labors is so pinched by poverty that each day of his existence is a nightmare of dread and worry. To be obliged to see one's physical and mental powers waning is bad enough, but to have heaped on this the misery of approaching old age in financial distress is a real tragedy of life.

Why is it that the members of our profession have not learned the lesson of frugality by the numerous examples we have all seen of cases of this kind? Why is it that men in the heyday of their vigor cannot look ahead to the time—the inevitable time—when their physical efficiency must begin to fail, and they must reckon with the toll of Nature?

Every young man studying dentistry should be schooled on this subject and impressed with his obligation in the matter. It will no longer do to hide our heads behind the barrier of a false professionalism, and ignore one of the fundamental obligations of life, because it is false professionalism to close our eyes to the stern necessities of our practical existence. It has amply been demonstrated that man cannot live in this world without material sustenance,

any more than he can live "by meat alone." Why cannot men consider this fundamental law of Nature? To see some men—many men—conduct their affairs, one could believe that they never gave a thought to the practical problems of life. They go on day after day on the apparent assumption that there never will be any tomorrow. But tomorrow comes—sometimes numerous tomorrows—and some place in these tomorrows, there is always a day of reckoning.

Many reasons have been given for the improvidence of professional men. They have been excused on the ground that the character of their work did not tend to the development of business sagacity—that a man could not be a good professional man and a good business man at the same time; that, as has already been intimated, there was an incompatibility between professionalism and financiering. It has also been intimated in certain quarters that it was an unseemly thing for a true professional man to study financing, that all of his energies and interests should be concentrated on the scientific and service side of his calling, without thought of so base a thing as money. But there is in the affairs of men such an entity as balance, and while pure idealism is one of the finer things of life, to be too idealistic is to suffer the penalty of considerable material discomfiture. After all, we should at least have as much respect for a man who has some money, honestly gained, as we do for the man who has no money at all. In other words, it is no longer a virtue to be poor. We must, of course, admire the man who becomes so absorbed in scientific study and research that he loses sight of everything in life except the one object of adding to the sum total of the world's knowledge, and yet too frequently this kind of man, in contributing to scientific lore, leaves his family to suffer the humiliation of deprivation and want. It is a noble sentiment to sacrifice oneself for the benefit of humanity, but it is an open question as to how far it is legitimate to carry this at the expense of a reasonable provision for one's immediate family. Family ties should be the most sacred thing on earth, and no man is doing his full duty in the world who ignores his obligation in this respect. In the present age, with undoubted economic opportunities on every side, there can scarcely be any excuse for a man—even a professional man—to permit his family to go in want. This, then, should be at least one of the aims of every dentist—to so shape his affairs in the early years of his professional life that ample provision shall be made for his declining days. It is morally and ethically wrong not to do this, which fact should be impressed on our young men at every turn.

Just how this may be done would furnish a very fruitful topic for discussion if there were no other subject assigned for the present paper, but the consideration of ways and means must be limited to the smallest possible space. Most dentists with any professional and business acumen make sufficient income to supply all their legitimate wants, and at the same time provide a surplus—however small it may be—to start an investment fund. After all, saving is largely a habit, and it is a habit that men should acquire early in life. Saving and niggardliness are by no means synonymous terms, as some would seem to suppose. It is with this as with all the affairs of life—what we most need is balance and common sense. The fault with the majority of professional men is that they do not apply themselves to a systematic study of their business affairs, apparently proceeding on the theory that matters of this kind need no study and little consideration. Business may be reduced to a science with almost as great a certainty as any other of the interests of life, and every dentist should take cognizance of this fact.

It is probably in the matter of investments that most professional men blunder more than in any other of their business affairs. What a world of misery has been brought to the families of dentists through folly in making unwise investments! Promoters deliberately select professional men as their proverbial prey, and the time has come when dentists should recognize this and govern their investments accordingly. An entire paper might profitably be devoted to investments for dentists, but at this time it must suffice to touch on it only incidentally, and possibly to refer to a paper I read before the Nebraska State Dental Association in May, 1923[1].

One of the first things for the professional man to learn is that he should seldom rely solely on his own judgment in making his investments. Investing money is a business in itself, and the wise thing to do is to consult someone who has studied this business. There are men in the world of finance—many of them—who are of known probity, and whose advice is very valuable. It is only reasonable to suppose that their judgment would be much better, after years of study of finance, than that of the professional man who has seldom made any study of it at all. Of course, sometimes big men in business fail—no one is infallible—but the chances are ten to one that the honest banker or broker or merchant is safer to follow in investments than the average professional man. And there is one encouraging feature about the matter under consideration—the readiness with which most of our great financiers will take an interest in a professional man and offer him sound advice. Every dentist has among his patients men of the character referred to, and they are usually very magnanimous in offering advice. Making money earn more money with safety is the secret of ultimate financial success, and the dentist who solves the problem of doing this is well on the road to a competence.

I have only one or two general but fundamental suggestions to make. Never speculate—it is not the function of the professional man to do this successfully—and never concentrate all of your investments in one enterprise. Speculation has wrought the financial ruin of many men besides dentists, and while some dentists have been fortunate for a brief period, it is safe to assert that not one in a thousand who have "played the market" has ever come out permanently successful. Where men who are in the business of speculating so frequently fail, it is not within reason to expect a novice in the game to succeed. The tendency among some men to risk all their earnings in one venture has been accountable for the economic ruin of many dentists. No financial fabric is invulnerable, and some of the most promising have gone to the wall under pressure. They are conducted by men who are human, and are thus hedged about by the limitations that attach themselves to human intelligence. If investments are divided in different enterprises, they are not likely to all go wrong if they have been chosen with care, and though some may depreciate, it is more than likely that others will make up for it by a substantial gain.

One more admonition that may be given with decided emphasis: never be caught with the lure of the "get-rich-quick" schemes that are dangled as a bait before professional men at every hand. This advice is decisive and subject to no exceptions. If all the ingenuity that has been expanded on schemes to separate dentists from their hard-earned money had been directed to legitimate purposes, it would have gone a long way toward revolutionizing our whole social and financial fabric, and would have added to the material and moral welfare of the world. Why dentists still continue to be caught after all the

1. Johnson, C. N.: Dental Economics with Special Reference to Investments, *J.A.D.A.* 10: 504 (June) 1923.

warnings that have been given them is beyond belief. The classic statement attributed to the late P. T. Barnum, that "a sucker is born every minute" would seem to hold true when applied in its relative percentage to professional men.

But there is another phase of the economic problem to which I wish to direct particular attention at this time. In the recent past there has grown up a tendency among a certain class of dentists which unless checked will eventually wreck our whole professional structure and make us a byword in the land. In common with the general demoralization and lack of equitable sentiment following the war, some of the members of our profession seem to have been thrown off their balance and incited to do things that are scarcely within the pale of respectability. The prevalent perverted commercialism of the age has apparently taken root among some of our profession, and unless there is a change we are likely to be brought into disrepute. While the major part of this paper has been directed toward the advocacy of better business principles in professional life, it is by no means intended to sanction certain methods in vogue at the present time. Men have developed some grotesque ideas regarding fees, and have been making charges that were not justified by the service rendered. Good fees for dental service are perfectly proper, and should be requested and paid. There is no work more exacting or demanding more skill and energy than well-performed dental service. The public should be schooled into this idea and shown by a sincere devotion to our work that it is true. Usually people are willing to pay good fees if they are convinced of their equitability, and it is an encouraging sign of the times that good fees are more willingly paid today than ever.

But there is a danger that we are going to "kill the goose that lays the golden egg." There has been a growing tendency among a certain class of dentists deliberately to "work" patients for the largest possible fee without the slightest relation to the character or difficulty of the service rendered. This is wrong in principle and fatal in practice. Lincoln's oft-quoted remark is applicable here: "You can fool all the people some of the time, and you can fool some of the people all the time, but you cannot fool all the people all the time." The paying of a good fee for good service creates respect and confidence, but the paying of an exorbitant fee for indifferent service creates disrespect and suspicion. Also, it sometimes makes people swear about dentists, and this is not good either for the people or for the profession.

Let us be honest with the public as well as with ourselves. Let us have the moral courage to demand a just recompense for everything we do, and then let us put ourselves in the patient's place and perform the kind of service that we would want done if we were the patient. This great moral principle of always "doing unto others as you would have others do unto you" is one of the most sublime sentiments ever written into the ethics of the human race. The greatest constructive discipline in our lives is to gain sufficient mastery over ourselves to see always the other man's point of view. It is broadening in its influence and humanizing in its tendencies. There is no question that in numberless instances in the recent past dentists have charged patients fees which, if the tables had been turned and they had been asked to pay similar fees for similar service, they would have howled to heaven in protest. Selfishness and narrowness of vision are the great besetting sins of our common humanity. Out of the welter of all the discord in the world at the present time dentists should learn the lesson of equity and justice. We cannot afford to be known as a profession of profiteers.

Then there is a practical side to all

of this. If dental service is made too expensive, it is going to prevent many worthy people from having it performed. It is becoming notorious now in some of our hospital circles that the fees are so prohibitive that the current remark is that poor people can no longer afford to be sick. And yet poor people do get sick, and sometimes, owing to present economic exactions, they do not receive the service to which they are justly entitled. This is wrong, and while we cannot hope immediately to usher in the millennium of universal adequate medical and dental service to all, let us at least take cognizance of the needs of the middle and poorer classes, and not raise our fees so high that they are wholly out of their reach. The net result of some of our fee rates is to drive people into quack offices where otherwise they would never think of going.

Then, again, a study of the economic history of dentists will go to show that it is not always the man who charges the highest fees that makes the largest income or saves the most money. Some men avowedly would prefer to work part of the time at high fees than to work all the time at moderate fees. It is usually assumed, of course, that it is every man's right to regulate these matters as he wishes. There is no law to compel a man to work all the time nor to limit the size of his fees. He is a free agent, and yet it is a question as to the moral right deliberately to limit his production according to his own whims when there is so much in his given occupation that is crying to be done. It is a nice question and one not easy of an answer. Every man must reckon with it from the dictates of his own conscience.

But the thing that concerns us most now is the reaction of the people to these grotesque fees. It is not a good financial asset for any profession to lose the respect of the people, and no system of charging is ever going to be successful which does not take into account the welfare of the patient. This is fundamental. The people must receive a character of service commensurate with the size of the fee charged, and this in the recent past has not always obtained.

Undoubtedly, our profession has been lured away from its bearings by the prevalent tendencies of the age. Profiteering is rife in all occupations, and the miasma of greed and gain has permeated the recesses of every activity of life. It has become axiomatic that prohibitive prices in all lines have curtailed production to a serious degree, and the entire country is not developing as it should in consequence. That this is basicly wrong no one can deny, and in no line of effort is it more deplorable than in the professions. Pity the day when the professional man shall sink his soul so low that the sordid greed for gain shall crowd out all those finer instincts of our common humanity, and transform our dental offices into so many temples of the money changers.

The greatest joy of professional life, after the needed provision has been made for the proverbial rainy days which come in advancing age, is the glory of service. To take from the drawn face of agony the pain which distorts the features and racks the body, and to bring the blessed balm of relief; to change a tear to a smile, a gasp of suffering to a sigh of comfort; to take a little sobbing child and by the magic of our art to silence the cries and bring the sunshine of happiness into the tiny face; to bend over the decrepit form of age and lighten the burden of distress and disability; to lift humanity out of the mire of misery and despair—all of this is better than great riches, or the plaudits of the crowd; all of this sanctifies the soul and makes of us bigger, broader and better men. The rewards of professional life are not wholly those of a material kind. The greatest reward comes from doing good and being kind, of doing good all the time, now, henceforth and forever.

CYSTS AND TUMORS OF THE JAWS

By HENRY SAGE DUNNING, B.S., M.D., D.D.S., F.A.C.S., New York, New York

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

NEOPLASMS of the jaws are very common. It is difficult at this time to state accurately the percentage of their occurrence as compared with new growths elsewhere in the body, as authorities differ considerably on this point.

The mouth is an interesting cavity; its pathology is being rewritten every day, and probably will continue to be for a very long while. As yet there is a great deal for all of us to learn regarding this region in health and in disease. To lend added interest to our subject we might say, in passing, that the mouth and jaws are continually being insulted and traumatized and that the latter are subjected to direct infection more than any other bones of the body. I suspect that this last statement will be challenged by the men to follow me, but I would like to ask them to name any bones in the body that often have thirty-two avenues in which infection can enter; also any bones that have such a delicate first line of defense as the gingival margin. On top of all this, think of the constant amount of irritation and traumatism that goes on in the normal mouth, from smoking, drugs, food—hot and cold—poor dentistry, mechanical abrasions and infection. Is there any other cavity that compares with the oral cavity in the same amount of injury? I cannot think of any, even including the stomach, the rectum and the vagina and uterus. These last-named organs surely are subjected to trauma, but I feel sure that the mouth overshadows them all in this respect.

Regarding the character of these neoplasms, of course the most important question to decide in regard to all neoplasms in any region of the body is whether or not they are benign or malignant. Early recognition of the growth is, of course, the only hope we can have in many cases of saving life. There are certain elementary distinctions that we must recognize in order to avoid mistakes. Malignancy means rapid growth, invasion of surrounding tissues, tendency to recur after operation, and tendency to ulceration. There is also a profound disturbance in the general nutrition of the body, emaciation or cachexia and the formation of metastases at a greater or lesser distance from the original tumor. Involvement of the neighboring lymph nodes generally takes place. Benign tumors do not have these characteristics. They grow locally and disturb only the animal organisms by the local inconvenience that they may produce.

It will, of course, be difficult to cover the subject of cysts and tumors of the jaw in a paper such as this. My real purpose is to show that these conditions

are not rare and that the dental surgeon is often the first person to have the privilege of seeing these cases in their infancy. His responsibility is great, as he often is the only one who can really do anything for these unfortunate people. Early scientific treatment is most important and, of course, to be able to give this, one must make an early diagnosis. An early diagnosis generally can be made by early operation and examination of tissue. Often a frozen section is enough at the time of operation. The extent of operation generally depends on what the frozen section tells the surgeon. Of course, all other means of diagnosis at one's command should be used, namely, the Wassermann test and other blood tests, culture of the mouth, radiographs, and sometimes the tapping of a cyst cavity.

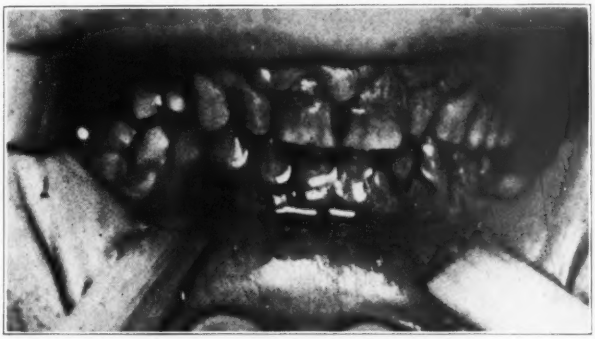

Fig. 1.—Neglected condition of the mouth, causing hypertrophy of the tissues at the gingival margin. At several points the tissues are so congested that small tumor masses are already present.

Diagnosis

In studying any neoplasm of any region, the surgeon (1) must consider, as Scudder states, the history of the tumor—its time of appearing, its precise location at the beginning, its size when first detected, the rate of growth, the tissues involved, the possibility of trauma, the condition of teeth in early and adult life, associated conditions of pain, discomfort and deformity, the presence of glandular enlargement, metastatic growth, cachexia, syphilis and tuberculosis and (2) he should make a careful examination of the tumor to determine its physical characteristics and microscopic structure.

Cysts

The cysts of the jaw may be classified as: (1) radicular or root cysts; (2) follicular or dentigerous cysts; (3) multilocular or epithelial odontoma, and (4) ranular.

1. *Radicular Cysts.* Cysts connected with the roots of fully developed and erupted teeth are called dental cysts. The development of these cysts can be traced most often to irritation from infection. Cysts of this character are more common in the maxillae and often arise from pathologic conditions associated with the molar teeth. According to Turner, the formation of these cysts takes place from the epithelium from the aberrant masses proliferating and forming a solid tumor. The epithelial portion is often solid and is spongy in character. On the periphery the cells are in active

growth and those toward the center are undergoing degeneration. Around this epithelial mass a capsule is developed from the mesoblastic cells. The cells in the center of the mass later degenerate and liquify, forming a distinct cyst. Meanwhile, the cells at the periphery multiply and increase in size toward the center and simultaneously undergo a process of liquifying degeneration. In this manner the fluid content of the cyst is formed, and by the growth of periphery and degeneration at the center, the enlargement of the cyst is made clear.

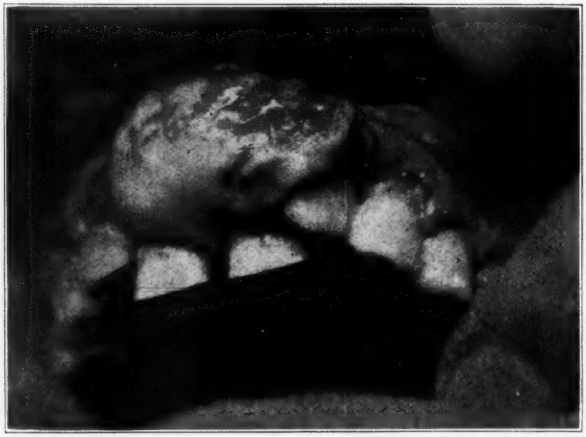

Fig. 2.—The condition seen in Fig. 1 often goes on to a true epulis, fibrous in character and with one or two pedicle teeth loosening, as shown here. This condition is generally caused by infection and chronic irritation.

As the cyst is a fluid growth, it will displace the tissues and enlarge in the direction of the least resistance. In the upper jaw the cyst pushes outward or externally, oftentimes, and generally perforates at some point. This often happens in the wall of the antrum and results in a more or less obliteration of the maxillary sinus, depending, of course, on how long the process is allowed to go unchecked. Often in the anterior part of the maxillae the cyst may start in the incisor fossae and encroach upon the floor of the nose. As a rule, in the mandible, the outer plate is more thinned out than the inner plate. This does not, however, always follow, and often both plates are equally impaired. Cysts connected with teeth do not actually denude them of their periodontal investment, as a rule. A cyst may contain a translucent, mucus-like, viscid fluid in which are found cholesterin crystals. No fats are found, but albumin is sometimes present. An outer layer of connective tissue generally forms the capsule of the cyst. This is lined with epithelium which may be of the stellate form or of the stratified variety, according to Colyer. In many cysts the epithelial cell growth is active and the connective tissue is thick and resembles in structure a multilocular cyst.

In the contents of the cyst micro-organisms may be found. Sometimes the contents are sterile, although at one time they were of an infective type. A cyst

may be sterile for a long while and become infected, after some form of trauma which seems to activate inflammatory processes. I have seen such cysts quiescent for years, and, on injury, they become inflamed, and suppuration followed.[1]

Symptoms.—Dental cysts are generally smooth and rounded in outline. The growth is slow but often continuous. Inflammatory symptoms may be present; when absent, the soft tissues are freely movable over the bony cavity. After considerable thinning of the bone, the bony cavity often can be compressed and an eggshell crackle can be felt. When the cyst causes a sufficient destruction of the bone, fluctuation can be obtained and and this may be outlined by the edge of the cyst cavity, which generally is sharp and thin.

Treatment.—There are numerous ways to treat these cases, but thoroughly removing the outer wall and leaving the lining membrane is best in the larger cysts. The edge of the lining membrane is sutured to the gum tissue and a primary union takes place. This is called the Partsch operation No. 1. It is often good practice to pack this cavity for forty-eight hours with antiseptic gauze to keep the mucous membrane in place. This operation is not indicated in multilocular cysts.

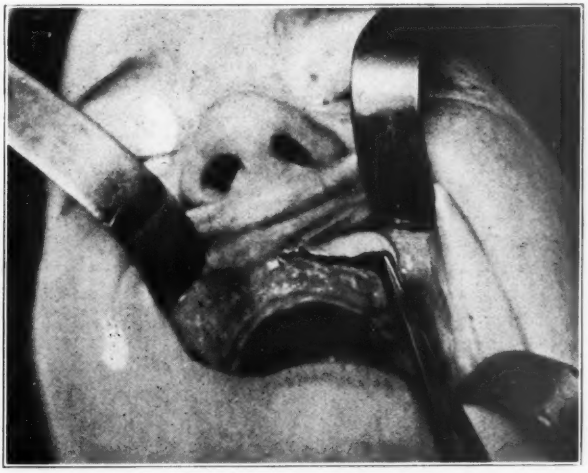

Fig. 3.—Any simple tumor may be formed by constant irritation from an ill-fitting plate, as shown here. The patient, who wore the plate for about fifteen years, now has a large flap of redundant tissue which has sucked into the plate and is constantly growing.

Cystic disease of the antrum is not common. In these cases, the mucous membrane of the antrum becomes the seat of the cystic growth. According to Heath, the case is one of gradual dilatation of the maxilla until there is marked thinning of the bone. Cystic disease of the antrum must be differentiated from other cysts. They must not be confused with cysts that arise from in-

1. Boxing: Schneider case.

fected teeth and encroach upon the antral cavity. A good many cases of so-called cysts of the antrum are really dental cysts and are incorrectly diagnosed. Dental cysts that encroach upon the antrum often cause an obliteration of the antral cavity and produce an expansion of the antero-external wall of the sinus.

2. *Follicular or dentigerous cysts.* The subject of the origin of these cysts has been discussed for a very long while. The explanation of Malassez perhaps is the best for us to follow. Malassez found, in studying the development of the teeth, that in connection with the unfolding of the squamous epithelium of the mouth which leads to the formation of the enamel, outbuddings of the cells at various levels from the gums to the enamel organ occur. These buddings and the epithelial strands from which they come are atrophied later and disappear. Some of them, and part of the main strand of the epithelium connected with the formation of the tooth root may remain as small nests of epithelial cells, which Malassez termed "debris epithelium paradentaires." According to Malassez, these nests have the power of proliferating and of developing into cysts or solid masses of squamous or adamantine cells or of new growths containing both forms of cells. According to his explanation, it is possible for all cysts of the jaw to form from these nests of epithelial cells. His teachings explain the presence of the epithelial lining of the unilocular cysts which occur in the periodontal membrane, a place where no epithelium is found normally.

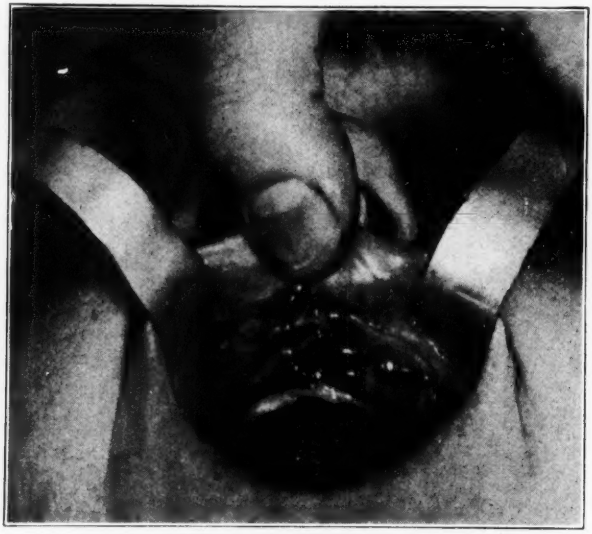

Fig. 4.—Same case as in Fig. 3, when plate is out of mouth.

The dentigerous cyst often attains considerable size. It is generally situated posteriorly in the mandible between the two plates of bone. It may occur, however, in the maxilla and is

often associated with the development of a supernumerary tooth. The sacs of these cysts can be easily stripped from the bony cavity. They consist of fibrous tissue lined with squamous epithelium. There is generally present in the sac or in the wall a tooth either developed or in the process of developing. Teeth, however, may be absent. These cysts appear during the developmental period and therefore not much later than the twenty-first year. Their growth is slow and painless and the patient often does not know that such a growth is present. In fact, they often present no symptoms at all and are found by means of the radiograph alone. As the cyst is situated between the plates of bone, and as the external plate is the thinner, the cyst generally displaces the outer wall. In the later stages there may be an eggshell crackle if the bone becomes thin enough.

Fig. 5.—Chronic irritation of a porcelain dummy forced into the gums, causing a fibrous epulis in a comparatively short time (about one year).

3. *The Multilocular Cysts.* These are composed of round cysts varying in size from a kernel of corn to a walnut. They are more frequent in the mandible than in the maxillae. They may be of a large size, irregular and nodular in form, and they often invade the ramus. They may be hard or compressible if the bone is thinned out sufficiently. If this occurs, there may be an eggshell crackle or even fluctuation. Microscopically there appears in the stroma epithelial products such as strands, masses, tubes and adamantine cells. These cysts may occur from the recurrence of other cysts of another variety, according to Poole. This is, of course, important for us to know, as the change in char-

Fig. 6.—Epuli may be dangerous and often do change their characteristics. This patient died of a round-cell sarcoma about a year after I removed a typical epulis which was attached to the first molar on the right side.

acter of a cyst may be a serious matter in the end. A multilocular cyst which is generally considered benign may, after a period of years, become malignant. The solid part of the cyst proliferates, while the cyst sac remains stationery, and the result is that a cellular neoplasm forms. Many recurrences have been reported, and also metastatic involvement has occurred when the character of the cyst has changed.

The adamantine cyst nearly always occurs in the mandible near the angle. It is generally of a fibrous character and presents cystic cavities. Many varieties exist between these solid tumors and the multilocular cysts, these tumors being rich in fibrous tissue stroma. Throughout the substance of these tumors there are masses of epithelial cells which may have originated from the enamel organ. These types of tumors are generally regarded as benign, but to avoid recurrence they must be thoroughly and widely removed, or they may degenerate into an epithelioma.

Fig. 7.—Roentgenogram of a true odontoma. The large mass shown was shelled out very easily by laying back the gums and soft tissues. The mass contained enamel, dentin and cementum. It was very hard to decalcify and the enamel work appeared to cover the outer aspect of the tumor. The patient was about 4 years old.

Treatment. — Unilocular cysts are often removed by the extraction of teeth to which the cyst is attached. If, however, they are not removed by this method, the cyst wall should be opened, the sac carefully removed, and the bony

cavity packed and treated until it fills in with granulation tissue. Some of them take a long while to granulate.

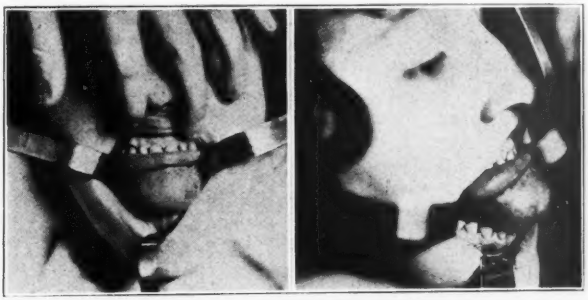

Fig. 8a Fig. 8b

Fig. 8.—Large ranula, which was carefully dissected out without breaking the sac; this I believe the proper treatment for absolute cure. The entire sac should be removed when possible to do so.

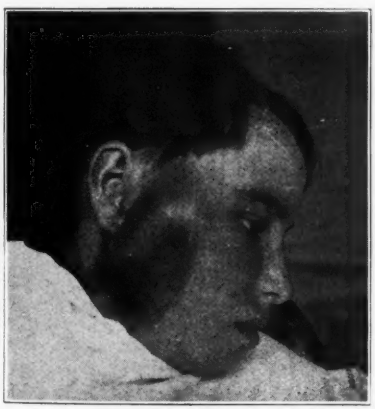

Fig. 9.—One of those undiagnosed swellings of the parotid gland due to some low-grade infection that seems to persist for months and months in young children and never goes on to suppuration. This case made one think of a neoplasm for a very long while, and then gradually subsided. These parotid tumors are hard to diagnose and hard to treat.

The multilocular and adamantine cysts should be thoroughly removed. I believe that all cysts should be thus treated, but of course much depends on the type of cyst with which we are dealing.

Fig. 10.—Large giant-cell carcinoma of a young boy, aged 18. Resection of one-half of the maxillae cured this patient for five years.

TUMORS

4. *New growths of dental origin.* In this class we find that the odontomas are very interesting to the dental or oral surgeon. The odontomas are solid

tumors that are dependent on the anomalies of the developing teeth, and are formed by the hypertrophy of the dental tissues. Their occurrence is in youth and they are found in the mandible generally connected with the permanent molars. They originate during the development of the tooth and, according to Poole, present four types which vary greatly according to the period of development. Poole says that

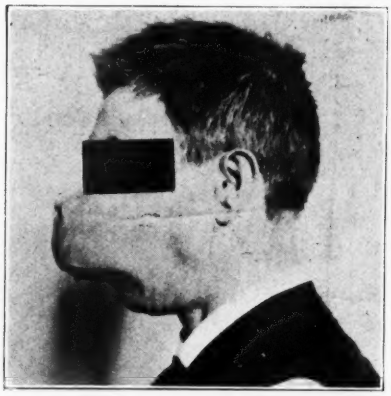

Fig. 11.—Chondroma of upper jaw, a benign tumor, after the removal of which an excellent result was obtained.

"first the dental papilla may give rise to a soft fibrous or even myomatous tumor which lies in the surrounding bone. A slightly later stage in the development of a tooth gives rise to the odontoplastic odontoma, which is the most important variety. This may be fibrous with grains of dentin or may consist of irregular masses of dentin, sometimes resembling ivory. It grows in a cavity of the bone, the walls of which become very gradually thinned out as the tumor enlarges. At a period when the crown develops, but before the root has formed, the third or coronary type occurs. This is usually a circumscribed protuberance upon the tooth and does not of necessity prevent the development of the root or the eruption of the tooth. Lastly, there is the radicular or root type, which may become large and prevent the eruption of the tooth."

Tumors of nondental origin. Probably the most common neoplasm in this

Fig. 12.—Symmetrical swelling of mandible in man, aged 21. There was a history of injury to the jaw when patient was about 12 years old. Incision into the mandible and removal of some of the bone showed that the bone was absolutely normal and that there was a hypertrophy of the bone on this side.

group that the dental surgeon sees is the epulis. It is of the least importance, in a measure, as it is benign and, as a rule, if thoroughly removed, does not recur. This tumor arises from the alveolar border and, as its name implies, it is a growth upon the gum. It is a slow growth and is often considered to be half way between inflammatory tissue and a neoplasm. Its occurrence is most often in young adults and is

more often present in the female than in the male. The cause of this growth is generally irritation of a sharp root, dentures, sharp bone, etc. I have seen many epuli occur in mouths in which chronic gingivitis was present. Deep pyorrhea pockets containing calcareous deposits are often the cause of these growths. When the teeth are pushed apart by the growth it is usually more benign than when the teeth are loosened and lifted up by the growth. When the growth loosens the teeth, it is more apt to originate from the bone and is then generally of the giant-cell sarcoma variety. These tumors often appear in the cuspid and bicuspid regions, upper and lower. There are two varieties: the fibrous and the giant-cell or sarcomatous epulis. The fibromatous epulis is generally of small size, projecting between the teeth, and is not very vascular. It arises from the alveolar dental periosteum or the connective tissue between the bone of the alveolar border and mucous membrane of the gum surrounding the teeth (Bloodgood). It may arise from the alveolus of a tooth. The sarcomatous epulis forms a soft, red, irregularly rounded mass, seen upon the gum border, internal or external to the tooth. This growth is very vascular and bleeds easily. The bone is rarely invaded by an epulis. Gunzert has called attention to the fact that an epulis may remain quiescent for a long while, then begin to grow rapidly during pregnancy, and finally retrogress or remain quiescent after the birth of a child. This I have seen often. An epulis that has not been operated on may grow to be of great size and, on account of its tendency to bleed, can render a person quite anemic. The prognosis is good if it is thoroughly removed. I know of only one fatal ending (Fig. 6). In rare cases they turn into sarcoma and grow with great speed.

Fig. 13.—Roentgenogram of large dentigerous cyst of mandible with buried third molar inside the sac. There were a number of cavities and partitions in the cyst wall and the cyst sac was very thick and filled with thick pus. It included the entire ramus and body of the bone up to the second bicuspid.

The diagnosis is often very easy and I am sure most careful dental surgeons can with some practice recognize them.

Treatment.—Treatment consists of removing the tumor surgically and applying actual cautery to its base. It is often necessary to extract the tooth on either side of the epulis and by means of chisel and rongeurs remove entirely the alveolar process of this region. Scudder feels that it is seldom safe to keep even healthy teeth on either side of this growth and to remove growth alone with the knife or cautery.

Sarcoma of the jaws is a malignant connective-tissue growth and is found most often in bone. It produces metastasis through the blood channels and, although apparently entirely removed, recurs often at a later date. It may arise from the marrow of the bone or the periosteum or from the wall of the blood vessels of the bone. We have the giant cell, round cell and spindle cell as the usual type of growth microscopically considered. Sarcoma of the jaw generally occurs in youths and young adults; occasionally it occurs in old age. Sarcoma is quite common in children, but this growth of the jaws is quite rare. It is a little less common in the jaws than carcinoma. It is also more common in the lower jaw than in the upper.

A very large chapter could be written on the different types of sarcoma, their origin and their mode of growth. Time will not allow a detailed description of these growths, and as I stated in the beginning of my paper, my only object is to create an added interest in the subject of neoplasms of the jaws so that the average dental surgeon will recognize "what he is up against" and will immediately take steps to protect his patient and, incidentally, himself. Any man that has the occasion of seeing many of these neoplasms of the jaws can tell you strange stories of how such and such a tumor or cyst was stimulated in its growth by improper operation, by silver nitrate stick, by packing, by "doing nothing" or by "watchful waiting," until the patient was lost and the dental surgeon's reputation was badly marred.

Fig. 14.—Roentgenogram of true dentigerous cyst, which was infected; there was a sinus between the first and second bicuspid on that side.

Scudder thinks that Coley has proved

that there is some basis for the idea that acute traumatic malignancy is a "definite something." Out of 970 cases, 225 had a definite history of injury. Fifty-two per cent of the 225 cases developed within one month after the injury. I have seen several cases of sarcoma that have developed following an injury; one case developed incidental to a fracture of the mandible and a subsequent long period of osteomyelitis. Bloodgood agrees with Coley regarding the importance of the practitioners being careful and bearing in mind the possible late effects of a trauma.

Fig. 15.—Roentgenogram of a large radicular cyst due to the infection of the first molar just above cyst. The cyst had a partition through the center, as shown.

Melanosarcoma occurs most often in the upper jaw; it is extremely malignant, ulcerates often, grows rapidly and causes metastases.

Carcinoma appears more frequently in the upper and lower jaws than sarcoma. There are, according to Scudder, about three cases of carcinoma to two of sarcoma. It occurs more frequently in men than women and also later in life than sarcoma. It flourishes between the ages of 50 and 70 years. Carcinoma may be said to originate primarily upon the mucous membrane, gums and palate of the jaws. There is no carcinoma primarily in bone. Carcinoma of the jaw always starts in the soft tissue covering the bone and invades the bone secondarily. The central carcinoma of the upper jaw generally starts in the lining membrane of the maxillary sinus and is of the cylindric cell form. Killian thinks t[illegible] carcinoma may start from the dental alveolus, from the periodontal epithelial rests which are known to exist there. Central carcinoma of the mandible without involvement of the mucous membrane is unknown. Carcinoma of the mandible always starts from the ulceration of the mucous membrane or contiguous parts, cheek, face, neck, lip, glands or tongue. Cancer of the maxilla

generally starts from the mucous membrane of the nose and cheek. We very seldom find a carcinoma metastasis in the jaws. Little is known of its etiology, but in the mouth chronic irritation is believed to play a prominent part. It may start in old syphilitic ulcers, scars, etc. The symptoms are often vague, and sometimes there may be quite an extensive involvement of the jaw before there are disturbing symptoms or signs. Pain is usually one of the earliest symptoms of neoplasms starting within the alveolar border. Extraction of the teeth will not help these cases, but frequently after such extractions are made, the alveolus does not heal and goes on to ulceration. Ulcerations of tuberculosis actinomycosis and syphilis may be mistaken for carcinoma. The most accurate method of making a diagnosis is to take a specimen of microscopic examination while preparing for a radical operation immediately.

I am not in a position to speak accurately regarding the results obtained by the use of radium and roentgen-ray treatment. I can say, however, that in the cases which I have had treated by these agents, the patients have not been cured and they have been very little benefited. I believe that the use of the actual cautery is very good in removing ulcers and many neoplasms in the early stages where they can be thoroughly removed by this means. Wide glandular resection should be also practiced in cases where there is thought to be any question of metastasis.

Radiographs

Regarding the interpretation of radiographic findings of neoplasms of the jaws, I would say that at times it is very difficult and requires great skill and understanding to judge correctly what one sees in the radiograph. I doubt whether the average dental surgeon has enough technical knowledge and is familiar enough with neoplasms in general to make an accurate diagnosis by means of the radiograph. I should counsel him to obtain the advice of a skilled roentgenologist, if possible, in every case that is not primarily a clear condition. Even in these apparently simpler cases mistakes are apt to be made by the man who has not had a very broad training in this work. Osteomyelitis and gumma must be ruled out as soon as possible. This sometimes is difficult to accomplish, but the clinical picture must help us to render a diagnosis in these conditions. Cysts are rather differentiated from solid tumors, but from the radiograph alone, it is difficult at times to state exactly the type of cyst with which we are dealing.

In summing up I would say that I have tried in this paper to help dental surgeons, if possible, to prevent some of the tragedies that happen occasionally in some of the practices of our confréres who have not had the opportunity of seeing many cases of neoplasms of the jaws. I am anxious to interest the dentist in outlying districts where he can get little help at times, who must, therefore, often assume grave responsibilities. He can in the very beginning direct his patient along proper channels and feel reasonably sure that the patient will take his orders on account of the implicit confidence the patient has in him.

As stated at the beginning, the dentist is often the first person to see these unfortunate patients. If he is a trained man, he will at once become suspicious of any condition of the tissue that does not appear to him normal. He will at once say to himself that this abnormal condition is a "guilty" condition unless proved to be "innocent." So far, so good, but the next question will be of a more personal character. It will read something like this: Who is going to prove this condition innocent or guilty? The next will be: Am I the man to do so? If I do diagnose this case correctly, should I treat it? Realizing that time is the most important element in the early treatment of all neoplasms, if

our practitioner is honest with himself and fair to his patient, he will make an immediate decision. This decision will be based entirely on what he thinks will be best for his patient. If the decision is against the practitioner, he ought to send the case to a good surgeon or to a good hospital. Temporizing by cauterizing inadequately and other delays should not be countenanced. I should like also to make a plea for the eradication of all infection and the eradication of as much irritation in the mouth and jaws as possible. I feel sure that chronic gingivitis of long standing has a great deal to do in the causation of epuli. I believe that the periodontist can, if he is well trained, help enormously in the reduction of new growths of the mouth and jaws by eliminating infection and irritation and checking up on any tissue that seems to be hypertrophied or otherwise pathologic.

Discussion

Arthur E. Smith, Los Angeles, California: There is no disease which has baffled medical science to any greater extent as to its etiology and treatment than that of cancer. The cause of this grave malady still remains enshrouded in mystery and seclusion. Therefore we, as specialists of oral surgery, are often confronted with cancer cases, and are duty bound to utilize every known method and means in making an early diagnosis.

Early recognition of all malignancies, followed by efficient treatment with radium, the roentgen ray and surgery, is imperative. The discoveries which have been made within the last few years in the surgical treatment of wounds and the remote effects of diseased oral foci have been amazing. Clinical research has proved that merely removing infected teeth complicated with infection involving the alveolar process in the form of granulomas and cysts is bad practice and against the principles of modern surgery. Our experience and clinical records have proved that Nature will not absorb extensive periapical pathologic tissue. The tissues of the mouth, face and jaws are subject to a great number of diseases, some of which are local, and others of which are a local manifestation of a general disorder. The public should be impressed with the necessity of consulting the physician or oral surgeon with reference to any abnormality which may occur within the mouth and jaws, such as discoloration of the tissues, inflammation, abscesses, broken, decayed or infected teeth, swollen cervical or submaxillary glands, diseased tonsils or any other condition which may persist for more than a few days. Early consultation and examination by a competent diagnostician may prevent serious future complications. The insidious nature of cancer, syphilis, cysts, and all forms of periapical pathologic involvement demands their early eradication before a general systemic involvement has supervened. The misleading aspect of mouth infection is the fact that rarely do pathologic lesions such as infected teeth, cysts, carcinoma, sarcoma and syphilis cause pain or discomfort to the patient at their onset. However, many times these conditions are the primary factors which cause a general undermining of health, for which the patient seeks medical advice, only many times after pathologic invasion has left a permanent lesion in some vital structure. In the past, the practice of dentistry has been directed toward the preservation of the teeth almost solely for cosmetic and mechanical purposes. However, in the future let us hope that the practice of dentistry will have as its chief claim the prevention and cure of disease.

Arthur B. Crane, Washington, D. C.: I had a communication from Dr. Bloodgood some time ago asking in what way dentists could be educated to recognize the early signs of malignancy. My reply to him was that the only way they can be educated to recognize them is to see them repeatedly in order that they may become familiar with them.

It seems to me that every hospital that has a large clinical supply of malignant cases should, from time to time, invite the local dentists into the wards to examine those cases and to learn something about diagnosis in order that they may perform the utmost in the way of early recognition.

I should like to criticize Dr. Dunning's use of the word epulis, which means nothing and describes no pathologic condition. The mistake of using that term is very clearly shown in his photograph of the boy from whom a so-called *"epulis"* was removed which afterward recurred as a sarcoma. A tumor coming from the gum is either an inflammatory growth or it is a new growth. It is not an epulis.

Truman W. Brophy, Chicago, Illinois: I had an opportunity in 1902 to visit the Finchen laboratories in Copenhagen, Denmark, where was demonstrated the actinic rays of light in the treatment of growths of all kinds. Between 400 and 500 patients from all quarters of the world were treated there.

Tumors, especially, some malignant in their inception, were cured. That I know to be true, because the cases were followed up and in many cases there was no recurrence.

The actinic rays of light as used by Finchen are just as useful today as they were then. There has not been anything said here today, so far as I have heard, on the subject of the use of the actinic ray, not only for treating tumors, etc., but for sterilizing the skin in plastic surgery. This is a part of the work that should be very carefully studied and, I believe, better understood. I have used the actinic ray not only in sterilizing the surface of the skin before plastic operations but also for the purpose of preventing infection. Possibilities of infection are always with us and in some cases infection will take place notwithstanding the fact that all the precautions are observed. These cases are quite rare, but in the event of an infection, if the actinic ray were applied, say for thirty seconds, oftentimes one treatment would terminate the infection.

A. Berger, New York, New York: I believe that with our present understanding of the diagnostic uses of radiography, the types of cysts shown by Dr. Dunning will be pathologic conditions of the past in a short while. These larger cysts do not grow to that size over night. It takes from five to ten or even fifteen years before they attain such large size, and early radiographic examination might have prevented their development. I would, therefore, urge an early radiographic examination of all cases where there is an abnormality present. Often just a missing tooth should be a good excuse for a radiographic examination.

In diagnosing malignant cases we are often told to make our diagnosis early. It is unfortunate that most of these cases are not troublesome in the early stages of their development and they come to us when they have attained an inoperable stage.

At the last meeting of the New York State Dental Society, Dr. Bloodgood made the sweeping statement that cancer of the mouth is a preventable disease, and that in individuals whose teeth are kept clean and smooth, cancer rarely occurs. As we see these cases, they are almost invariably associated with neglected conditions of the teeth and oral cavity and the patient seeks no relief until something really disturbing occurs.

Another point in diagnosing malignant growths is that too much manipulation is not advisable. Manipulation often incites a more rapid growth and metastasis. We should desist, therefore, from undue manipulation of the tissues where malignancy is suspected.

H. W. Burnett, Fairmont, West Virginia: The use of ultraviolet light is going to mark a new epoch in dentistry, especially the application of violet light to all pathologic conditions of the mouth. This will apply not only to malignant conditions but to benign conditions especially.

Dr. Dunning (closing): Dr. Crane said that he thought that the dentist should be allowed to visit the wards in the hospital and that the dentist might be called in when there are interesting cases there for him to see. I would go much farther than that and say that I believe that the dental surgeons, especially the younger men, should all be connected with some sort of a hospital and be able to go among the poor and really have an opportunity to see and treat disease conditions. I cannot see any reason why the dental man should not do work in clinics and among the poor as does his medical brother.

I have started a number of clinics in different hospitals and find it is exceedingly hard to get the average man to work in the clinic for more than from six months to a year. Then he, as a rule, gets too busy and gives up his clinic connections.

I believe that every modern hospital in the future will have some sort of oral department or dental department or oral diagnostic department—it makes little difference what name you give it—just as every hospital has an eye, ear and throat department. I feel that the dental surgeon should be working with the physicians, and the closer they do work together, the better treatment the patient will receive.

Epulis, of course, as Dr. Crane said, is just a word which calls attention to swelling on the gum.

THE PROBLEM OF WETTING AND ITS IMPORTANCE IN BACTERIOLOGY

By W. P. LARSON, M.D., Minneapolis, Minnesota

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

DURING the last three or four years a series of papers have been published from the Department of Bacteriology and Immunology of the University of Minnesota in which attention has been called to the fact that bacteria may be divided into two classes with respect to their ability to become wetted. Since the early days of bacteriologic development, it has been assumed that those bacteria which grow on the surface of the liquid medium, "pellicle formation," do so because of their strict requirement of oxygen. They are said to be obligatory aerobes. In studying the effect of the surface tension of the culture medium on the growth of bacteria, it was noticed that these pellicle formers would often grow diffusely when the surface tension of the medium was depressed a few dynes by the addition of a small quantity of soap. It was further found that a large number of bacteria were very sensitive to a depression of the surface tension of the medium. Such organisms as the pneumococcus, streptococcus, tubercle bacillus, anthrax bacillus and numerous others would cease to grow if the surface tension of the medium was depressed a few dynes. These initial experiments convinced us that the surface tension of the culture medium is a very important factor in bacteriology.

In an attempt to analyze the mechanism by which the surface tension of the culture medium influenced bacterial growth, we were, after a long series of experiments, convinced that it resolved itself into a question of whether or not the medium in which the bacteria were growing actually wetted the organisms. The first question which seemed important to solve was whether or not bacteria grow upon the surface of a liquid medium because of their oxygen requirement, as has been generally assumed. It is well known that bacteria growing upon the surface of the medium can be sedimented by centrifugation, or they may be sedimented by slight agitation of the culture tube, or will ultimately sink to the bottom of the tube by force of their own weight. Now it is clear that if the organisms can be driven to the bottom of the tube by centrifugation or by agitating the culture tube, they must be heavier than the liquid upon which they are growing. If they are heavier than the liquid upon which they are growing, it follows, further, that when growing upon the surface of such liquid, they must be supported there by some force. This force, we conclude, is the surface tension of the medium. When the surface tension of the medium is depressed, there is no longer sufficient force to support the organisms on the surface and hence they grow diffusely. It may be mentioned at this point that the surface tension of ordinary beef broth is about 59 dynes. It varies from 54 to 60 dynes, depending on materials from which the broth is prepared, but standard meat infusion broth usually has a surface ten-

sion of 59 dynes. If it is the surface tension of the culture medium alone which is responsible for surface growth, we should expect that all bacteria would grow upon the surface of the medium when grown in broth of this surface tension. This we know is not the case. We know that most bacteria do not grow on the surface of the broth, but throughout the culture medium. Therefore, there must be other factors besides the surface tension of the culture medium on which surface growth depends.

As has already been stated in this paper, the phenomena of pellicle formation resolves itself into a question of wetting. To put it in another way, some bacteria are more easily wetted than others. It therefore seemed necessary to investigate the factors on the part of the bacteria which make them more or less wettable. It would seem that the most plausible factor that influences this condition is the fat content of the bacteria. (By fat content we mean the ether-acetone soluble substances.) Such pellicle-forming bacteria as the *Bacillus tuberculosis, Bacillus subtilis,* and others, are known to be rich in ether-acetone soluble material.

However, before one would be justified in drawing the conclusion that the fat content of the bacteria played a part, it would be necessary to cause a number of bacteria to become pellicle formers by increasing their fat content. Studies were therefore inaugurated with this end in view. The factors governing the fat content of bacteria have not been very thoroughly studied owing to the difficulties in obtaining sufficient amounts of bacteria with which to make such analysis. It has been well known among physiologists for many years that carbohydrates tend to be converted into fats in the animal body. We therefore cultivated a large number of bacteria on various carbohydrate compounds and glycerin with a view to determining the ability of bacteria to form fat from these various compounds. Before this work had progressed far, it appeared that whether or not a bacterium would form fats from carbohydrates depended on whether the carbohydrate was fermented by the given organism. By taking the two strains of the colon bacillus and growing them on saccharose, it was found that the strain which did not ferment the saccharose produced about twice as much fat from this medium as the one which did ferment that sugar. Bacteria grown upon glycerin, we found, tended to store up large quantities of fat and grew upon the surface of the medium. This we found to be true only when the organisms failed to ferment the glycerin. We found, for instance, that the bacterium, *Bacillus mucosus capsulatus,* commonly known as the Friedlander bacillus, which is an active fermenter of glycerin, does not make fat from that substance. Bacteriologists have recognized from the time of Koch that the tubercle bacillus will not grow upon artificial media except in the presence of glycerin or substances from which glycerin can be had. Since glycerin is a progenitor of fats, and since the bodies of the tubercle bacilli contain such large amounts of fat, we have here an explanation for the glycerin requirement of this micro-organism. A French investigator, Fruin, has reported that the human type of the tubercle bacillus contains about 19 per cent fat, based on the weight of dry matter, while the bovine type contains about 40 per cent of fatty substance. In 1905, the American investigator, Theobald Smith, showed that the human strain of tubercle bacillus ferments glycerin slowly, while the bovine strain does not. This action upon glycerin enables us to differentiate between the human and the bovine strains. We have here a reasonable explanation as to the differences in the fat content of the two strains of tubercle bacilli. The human strain burns a part of the glycerin and hence forms correspondingly smaller quantities of fat, while the bovine and the avian strains convert all of the glycerin used into fat.

We found that it was possible to cause all the bacteria we worked with to grow upon the surface of the culture medium provided they were properly "fattened." Therefore, we feel that we are justified in concluding that pellicle formation resolves itself into a question of wetting. If the organisms contain sufficient quantities of fat, the culture medium cannot wet the cell, and it therefore is supported on the surface of the culture medium because of the surface tension of the fluid.

By analogy we might cite the floating needle experiment. It is a well known experiment in elementary physics that if a needle is drawn between the fingers for the purpose of coating it with a film of oily material, it may be suspended upon the surface of water. The water cannot wet the needle, and hence the needle is supported by the surface tension of the water. The question which naturally presents itself to the mind of practicing men is, "What practical application may these observations lead to?" If we glance over a list of the well-known bacteria, we find that they divide themselves into two classes from the immunologic point of view. Such bacteria as the tubercle bacillus, the diphtheria bacillus, the pneumococcus and the streptococcus produce infections which are not followed by an immunity; whereas, such bacteria as the typhoid bacillus, the paratyphoid bacilli, the dysentery bacilli and the cholera vibrio produce infections which are followed by a permanent immunity. During and after the infections produced by the latter group of bacteria, antibodies may be readily demonstrated in the blood serum, whereas during and after infections produced by the former group, few if any antibodies can be demonstrated in the blood serum, and these infections, as already stated, produce little if any immunity.

Can these observations be correlated with the ideas of wetting expressed above? The fact that we can demonstrate no antibodies against such organisms as the tubercle bacillus might suggest that the fat in the tubercle bacillus resists wetting by the antibody and that this might explain why antibodies are not demonstrable against the tubercle bacillus.

Antibodies are either suspended or dissolved in water (blood serum). If water cannot wet the organisms, it would be reasonable to assume that the antibodies which are contained in the water cannot wet the organisms, and hence we might conclude that the reason why we are unable to demonstrate antibodies against a certain group of bacteria, and the reason that certain infections are not followed by an immunity, are due to the fact that the antibodies cannot wet the bacteria and they are therefore useless even though they may be present. However, such conclusions would not be justified without quite considerable experimental support. It was therefore proposed to study the effect of fat on the union between bacterium and specific antibody. The staphylococcus was chosen for this experiment since it can be readily "fattened" by growing it in glycerin broth. If the *staphylococcus aureus* is grown for a few generations in glycerin broth, it will increase its fat content from about 6 per cent, based on the weight of dry matter, to approximately 40 per cent. Rabbits were immunized with a strain of staphylococcus which had not been fattened. The strain of staphylococcus used for immunization was then fattened by growing it on glycerin broth. It was found that such a "fattened" strain of the staphylococcus would not be agglutinated by the immune serum, while the same strain, which had not been "fattened," agglutinated very readily. Here, then, we have an experiment which supports the theory advanced above that the fat content of the bacterium resists union between bacterium and antibody. We believe the explanation of the fact that the typhoid, paratyphoid, dysentery and cholera bacteria

produce infections followed by immunity is that these bacteria are readily wetted by the antibodies. This would explain not only the immunity, but also why antibodies are so readily demonstrated. Demonstration of antibody depends on union between the antibody and the germ.

For the last fifteen years there has been a tendency among medical men to treat many infections immunologically, i. e., either with vaccines or serums. From the work recorded in this paper, it would seem futile to attempt to control the infections caused by non-wettable bacteria by any sort of immunologic attack. If the antibodies cannot wet a certain group of bacteria, as seems to be the case from our work, little is to be gained from attempting to develop antibodies. On the other hand, immunologic procedure, especially prophylactic, against such infections as typhoid, paratyphoid, dysentery and cholera is indicated.

By a better understanding of the problem of surface tension, and the control of the surface tension of blood serum, it may be possible to depress the surface tension of the blood medium slightly, which would create a medium unfavorable to the growth of the non-wettable bacteria such as the pneumococcus, streptococcus and others of that group.

A condition of low surface tension further detoxifies bacterial poisons. It has already been shown by work published from this laboratory that the pathogenicity of certain bacteria is destroyed when the organisms are placed in a medium of low surface tension. Not only is their pathogenicity destroyed, but their toxins are destroyed almost immediately when soap or other surface tension depressant is added. This has been shown in an experiment with the *actinomyces gypsoides*. This organism is not only very pathogenic for guinea-pigs, but also very toxic, as is evidenced from the fact that when a small amount of a killed culture of this germ is injected into a guinea-pig, the animal dies from acute toxemia. If, however, the organism is treated with soap or other substance having a low surface tension, its toxicity is completely destroyed. This experiment led us to study the effect of the surface tension on certain well-known bacterial toxins such as diphtheritic toxin and tetanus toxin. In these experiments it was found that the two toxins named lost their toxicity completely by being treated with soap. The toxicity of these toxins decreases directly with their surface tension.

THE DENTAL HYGIENIST

By C. J. HOLLISTER, D.D.S., Harrisburg, Pennsylvania

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE dental hygienist is making a permanent place for herself in the schools of Pennsylvania. Reports coming to our office indirectly from teachers whose children have had the services of the dental hygienist enthusiastically state that a big improvement in school work and deportment was immediately noticeable after the visit of the hygienist.

Our experience with dental hygiene covers the last four years, and we say that almost without exception, the dental hygienists we have come in contact with have been young women filled with the spirit of service. They have shown a vision of a wider service than just cleaning teeth. In a number of instances they have started nutrition classes, aided in modern health crusade work and independently organized schoolrooms and buildings into friendly competitive "clean teeth brigades."

The popularity of their work is proved by the fact that one city starting with two dental hygienists now has a corps of six; another has four, another three, and several have two.

A dental hygienist having, first, the spirit of service to humanity and, second, vision to see her possibilities as a general health worker has a greater opportunity to improve general health conditions of a community than any other class of social service in existence.

The dental hygienist has an approach to the child which is entirely different from any that other health and welfare workers have. First, she has the child alone, often for his first experience in a dental chair. In the hands of a tactful and careful hygienist, the child has the surprise of a pleasant experience in the dental chair instead of one of suffering, as he anticipated from intuition and hearsay. This pleasant surprise wins the child's confidence. The hygienist then can exert an influence over him along dental and general hygiene lines as well as in giving instruction on proper diet.

The dental hygienist has proved herself to be not only a cleaner of teeth, but also a molder of good habits in children. The adage "Train a child in the way you would have him go and he will not depart therefrom" is applied here in a practical way.

During one of our demonstrations in a school building, the first child who presented himself for prophylaxis was one of the dirtiest youngsters I have ever seen in a schoolroom. The dental hygienist looked at him and said tactfully, "I cannot work for you; you are too dirty." She took him by the ear and led him to a washstand and then talked to him about keeping his body clean. After a few minutes the boy grabbed soap and nailbrush. He scrubbed his hands, shampooed his hair and even washed back of his ears—an unusual procedure, I'm sure. He then went back to the dental chair and the dental hygienist cleaned his teeth, talking all the while to him, trying to interest him in himself. His teacher came into the room just as he was finished. With-

out prompting, he said to the dental hygienist, "Thank you."

His teacher said to me, "That boy has been in my room all this year and that is the first courtesy I have ever seen in him."

The foregoing is a dramatic case, but it is a daily occurrence with the dental hygienist working with children to see them step from her chair with their heads up, eyes brighter and little chests held higher. Their interest in themselves is awakened much earlier than possible by any other method, owing to the fact that their improvement has been visualized immediately.

The Marion School Class here in Cleveland years ago proved beyond a doubt what good teeth mean to proper mental, physical and moral development. The argument then in favor of the dental hygienist is that to duplicate the Marion School experiment for the benefit of all school children would not be possible, for there would not be enough dentists to do the corrective work.

In Bridgeport, Conn., results of dental hygiene work have proved that a large percentage of tooth troubles can be prevented, as stated in the following news item:

"Since June, 1921, Bridgeport has enforced a physical education program which requires several health standards for promotion and as one of these dental requirements has been applied as a passing requisite from grade 5 to grade 6, since the major part of the dental hygiene work is done in the first five grades. The promotional requirement has been (1) a clean mouth; (2) a satisfactory demonstration of home care of the mouth, and (3) no unfilled cavities in the permanent teeth. Last fall practically 100 per cent of the children passed from grade 5 to grade 6 with sound permanent teeth and clean mouths.

"The Bridgeport school records indicate that the condition of a child's teeth has much to do with his progress in school.

"Bridgeport now spends less than any other city of its size for the schooling of children who are compelled to repeat their grades."[1]

After observing such results as indicated by the above, are we not logical in our assertion that the dental hygienist can be made one of the biggest factors in child betterment? In health matters, as in all things that have to do with large numbers of people, the solution lies in education. In the daily papers recently, I noted many high railroad authorities quoted as saying that the remedy for automobile accidents at railroad crossings lies in the education of the motoring public.

Following Dr. Fones' plan, if we can make teaching of proper diet and hygiene, both dental and general, an integral part of the daily life of the child for the first five years of its school life, we will be near the solution of much of the child health problem.

After consulting several authorities on defects of children, I feel safe in saying that, in the final analysis, the cause of most defects in children is nutritional. How can a child be properly nourished when he has a germ-infested mouth and chewing machine? Hence our apparent over-enthusiasm over the relation of clean teeth to general health and well-being.

The dental hygienist, to function to a 100 per cent efficiency, should have the supervision and advice of the dental profession; therefore, unless the dental profession has some other method of educating the public at large that will accomplish as much as or more than the dental hygienist, it should recommend and stimulate local civic authorities to make this service available for the children of the community.

Here is an opportunity for the dentist to become a real factor for the betterment of physical and moral tone

1. J. A. D. A. 10:660 (July), 1923.

of his local community, and we believe that if he is to be rated a real success in his profession and life, he should have a broader interest than just his own practice, and help to spread lessons of mouth hygiene to the lay public.

Our state department of health maintains a dental division for demonstrative and educational purposes. The object of our work is to try to arouse the interest and enthusiasm of local authorities to establish local preventive dental service, particularly in schools, though we are beginning to devote some effort to hospitals and industrial plants.

We have been working intensively along this line for the last four years, and now have the hearty cooperation of the American Red Cross, the Tuberculosis Society, chambers of commerce, parent-teacher associations, the state department of education, Rotary, Kiwanis, Lions, Civics and Women's clubs; in fact, all welfare organizations in the state are working with us. The Child Federation of Philadelphia has been doing a fine piece of work along this line. They, for the last two years, have employed a dental hygienist in group experimental tests that bid fair to bring far-reaching results in meeting the dental caries problem in cities.

The Philadelphia Interstate Dairy Council also is doing educational work of great value along the lines of teaching proper diet. In our problem of controlling dental defects by mouth hygiene education, we cannot overlook the diet factor. If human beings ate what they should in the way they should, tooth troubles would be almost unknown. Lower forms of animal life do not have toothbrushes, and, if living in their natural environment, neither do they have tooth troubles. This is because they eat and live as Nature intended.

We do not believe that just the cleaning of children's teeth and teaching the child to clean his teeth himself is the cure-all for all children's troubles, dental and general, but we do believe that this service is an opening wedge for the development of the larger general plan for health betterment, because the cleaning of teeth awakens the child's pride in himself not only in the appearance and condition of his mouth and teeth, but also as to his general condition and appearance.

In closing I shall try to give you an idea of the status of public dental education work in Pennsylvania. The state dental society, working through their mouth hygiene committee in cooperation with the state department of health, have a plan which is now being launched that will enlist the interest and services of every dentist in the state in a definite, standardized method of procedure to give the lay public full information and education in the care of the mouth and teeth.

The department of health has on its staff a dentist who gives full time to this work; he is also chairman of the mouth hygiene committee of the state society.

The state has been divided into nine zones, a chief being appointed for each zone. The plan of organization is as follows:

ORGANIZATION PLAN FOR THE PROMOTION OF MOUTH HYGIENE AND PUBLIC DENTAL HEALTH EDUCATION

Director (full time)—Official representative of the Pennsylvania Department of Health and Pennsylvania State Dental Society.

Nine Zone Chiefs—Appointed by the president of the Pennsylvania State Dental Society on recommendation of the Commissioner of Health, who, in turn, shall appoint county and community captains in their respective zones in numbers suggested by local conditions.

All above appointments to be effective until relieved.

SUGGESTED PLAN OF PROCEDURE FOR LOCAL DENTISTS APPOINTED AS COUNTY OR COMMUNITY CHIEFS OF THE PENNSYLVANIA STATE DENTAL SOCIETY COMMITTEE OF MOUTH HYGIENE AND PUBLIC DENTAL HEALTH EDUCATION.

I. Enlist and organize all ethical dentists into local committee—each to do his share of work.

II. Publicity

A. Through newspapers and other local publications, secure printing of standard articles and other written articles and material and papers prepared by local talent to be published, unsigned, as news, or by authority of the standardization committee of the Pennsylvania State Dental Society.

B. Provide for lectures and talks, where possible and advisable, using films, slides or descriptive charts, by members of local committee to school children, boy and girl scouts and other child clubs, parent-teacher association meetings, chamber of commerce, Rotary, Kiwanis, Lions, Civics and Women's clubs, American Red Cross, Tuberculosis Society, teachers' meetings and institutes, and any other welfare organization meetings.

(a) Outlines of lectures suitable for various organizations are being prepared now by the standardization committee of the state society. These outlines may be had by addressing Dr. C. J. Hollister, Department of Health, Harrisburg, Pa.

(b) It is suggested that you arrange at times to request dentists from surrounding communities to come in to give some of the above talks, you sending speakers to their communities in return.

III. Supervision of local preventive and corrective clinics.

(a) It is suggested that the local members of these committees be apportioned certain and definite duties. In this way, the proposed activities will take very little of any one man's time.

A. Serving as advisory committee to already established dental hygiene work in schools.

B. Campaign to interest local school and civic authorities in establishment of dental hygienist in public and private schools.

C. Serving as an advisory committee to already established public corrective dental clinics.

D. Where advisable to start movement to arouse interest to start corrective dental clinics offering volunteer operative aid (if agreeable) to demonstrate practicability and need of such public service.

E. Make dental examinations and survey of school children in cooperation with school medical inspectors and school authorities, using standardized blanks and methods.

F. Offer assistance to local public nurses, health workers and organizations in general community health program.

Flying Squadron:

To be developed locally to spend time at regular intervals in spreading the gospel of the clean mouth in the district.

To consist of local dentist, physician, dental hygienist and medical nurse. The personnel to be made up of the above or as far as possible. Suggested method of procedure is as follows, subject to local conditions: one day a month to be set aside for work. Squadron to go to schools and each member give a ten or fifteen minute talk on health from his point of view. This is to

be followed by a short diet talk and toothbrush drill (children using pencils in place of brushes) teaching the Fones or circular motion for the sake of standardization and efficiency.

a. Requested that if (as individuals) or as a committee, you have any ideas which will make above plan more effective or improve on it, you submit same to state chief:

Dr. C. J. Hollister, Chief, Dental Division, State Department of Health, Harrisburg, Pa.

QUARTERLY REPORT OF MOUTH HYGIENE AND PUBLIC HEALTH EDUCATION COMMITTEES

Number of dental hygienists in public work in your district .....
Number of dental hygienists in institutions in your district .....
Number of dental hygienists in private offices in your district .....
Number of corrective dental clinics serving general public .....
Number of corrective dental clinics in institutions serving general public .....
Fill in above only where changes have occurred.

ACTIVITIES OF LOCAL COMMITTEES

Number of meetings addressed .....
Approximate number of people .....
Number of talks to school children.....
Number of children present .....
Number of vocational talks to school children .....
Number of children present at vocational talks .....
Number of films and slides shown .....
Approximate number of people seeing films and slides of dentistry .....
Number of newspapers, magazines and other publication articles with clippings (if possible) .....

ANY FLYING SQUADRON ORGANIZATION AND WORK

Names of towns or townships where, in your opinion, dental hygiene might be introduced, and if the state organization can be of assistance.

Remarks—Comment freely on anything not covered in above questionnaire that has developed or could be developed along preventive dental educational or corrective lines in your district since last report.

This report should be in the hands of Dr. C. J. Hollister, State Department of Health, by the first of July, October, January, and April, so that it may be published in the next issue of the Quarterly.

The response given this plan by the profession generally in the state has been very gratifying to those directing the work, and we believe it will result in a full realization of the slogan we have adopted: "A clean mouth for every inhabitant in the state." This will be accomplished only by every dentist doing his bit.

At this time we have about thirty-five communities in the state which have preventive dental service employing dental hygienists. Altoona leads with a corps of six dental hygienists; Allentown has four; Scranton has three; Wilkes-Barre has two, and several others have two. Between fifty and sixty dental hygienists are engaged in public service work in the state and new ones are constantly being added. There are between sixty and seventy corrective dental clinics in the state operated on either volunteer or salaried operator basis. This number is constantly increasing, also.

Concerning the subject of corrective dental clinics versus the preventive and educative work of the dental hygienist: The corrective dental clinic has been in existence long enough to judge as to its efficiency, and those in position to know make the assertion that while the cor-

rective dental clinic has been of great value, it is entirely inadequate to handle the proposition at hand, because, with the many calls made on it for service, it resolves itself into an emergency proposition to relieve pain and does not teach the value of good teeth to the greatest number; hence, it is "a cart before the horse" procedure, "locking the barn door after the horse is stolen." For example, in these busy corrective clinics, Johnny has an aching tooth; he can go in and get treatment, for he is incapacitated and suffering, but his classmate sitting in the desk beside him cannot go in though he may have the beginning of dental decay; he has to wait until his tooth is broken down almost, if not entirely, beyond repair.

By the foregoing illustration, I do not wish to belittle the good the dental clinic has accomplished (I know of some such clinics that are doing some educative work and doing it as well as possible under the conditions), but I feel that, in a general way, in comparing the corrective dental clinic to the preventive and educative work best accomplished by the dental hygienist (up to the present time), there is little left for argument. The dental hygienist's service reaches all school children either by a practical prophylaxis or by education, the children themselves acting as teachers of the adult, carrying the message to the entire population.

A short time ago, I had the opportunity to go home to lunch. I was in a hurry. Sitting down to the table, I bolted my meal (which I should not have done) and started for the front door. I did not get there, as my little 5-year-old daughter cried in great distress, "Daddy, you forgot to brush your teeth." I went back for moral effect if for nothing else, and still in a great hurry, I started to give my teeth a "lick and a promise." There was nothing doing—I had to clean them the right way. This proves the old Bible saying, "And a little child shall lead them." That child made her daddy do what he did not want to do for himself. I have had similar experiences related to me by parents in many communities where dental hygiene instruction is given in the schools. To prove this point further, I refer again to the results in Bridgeport, Connecticut.

From a recent editorial in a New York newspaper, we note that the bakers of Bridgeport report that over 50 per cent of the families of that city are demanding and getting whole wheat bread. How was this accomplished if not by the education of the school child? If, in the future, the dental hygienists continue to show devotion to human service and broad vision of the possibilities of their work as a part of the general health program by continued cooperation of the dental profession and welfare organization, we believe that a method has been found to improve materially the health and well-being of the human race.

Therefore, it is logical to believe that in the promotion of dental hygiene and preventive dentistry, by the means of the dental hygienist, the dental profession has a golden opportunity to take its proper place as a big factor in the improvement of the physical, mental and moral condition of the world.

CONVOCATION ADDRESS OF THE AMERICAN COLLEGE OF DENTISTS

By JOHN V. CONZETT, D.Sc., D.D.S., F.A.C.D., Dubuque, Iowa

(Read before the American College of Dentists, Cleveland, Ohio, September 12, 1923)

NO organization or association of men can have any permanent value unless it has for its basic principle some ideal that has the welfare of humanity, the advancement of society or the benefit of the individuals composing it as its central and controlling thought. Neither can an organization ultimately prosper that is not original in its fundamental ideals. In this day when organization succeeds organization and association is built upon and within association—until the whole world seems to be organized to death—an organization that aims to be national or international in its scope and influence must needs have for its ideal some principle so lofty, and for its concept some thought so profound, that its right to existence shall not be questioned. Particularly is this true when that organization arrogates the right to say to whom the honor of membership shall be given and from whom it shall be withheld; when it implies that membership in it is an honor which is given only to the elect, and that such membership carries with it the prima facie evidence of eminence in his chosen profession. Whether the organization that bears the name of the American College of Dentists measures up to this standard or not will be the determining factor in its success or failure.

It is therefore the part of wisdom for us to pause a moment at this convocation of the College and consider the ideals from which the organization was conceived, the thought that developed it and the labor which brought it to birth, in order to see whether these ideals, thoughts and labors are worthy of a continuing abiding place in the great profession of dentistry.

By reason of the stress of circumstances, dentistry became a profession of its own. It is not, as a profession, a part of medicine, or of any other profession. It is the *dental* profession. When Drs. Hayden and Harris went to the Maryland University College of Medicine and asked that a department of dentistry be included in the medical college, they were refused. But not to be denied, they formed the Baltimore College of Dental Surgery, in 1839. This was the cradle of the dental profession, and from that has grown the profession as it stands today—a profession with its own colleges, degrees, journals and literature, a profession that has made a name and place for itself that has commanded the respect of the nations of the world, until today the name "American dentist" is the open sesame to a practice of affluence and honor in all of the countries of the world. The highest honors have been conferred on

members of the profession by the most distinguished crowned heads of the Old World, and the government of the United States of America, by act of Congress, has placed the dental profession on a par with the medical profession in its service in the Army and Navy. Therefore, today, dentistry stands on its own merits, and must in the future, as in the past, succeed or fail on the record of its own achievements.

The remarkable record which dentistry has made is one of the wonders of the world. Coming up from a trade that was recognized as little more than a cosmetic art, building its professional men from craftsmen and mechanics, creating a literature from the brains of men who educated themselves, and attaining the pinnacle of one of the "learned professions" in less than 100 years is a record that is unique in the annals of civilization.

But in the building of a profession so hurriedly, and that without the guidance of men of university training or experience, it is not to be wondered that some mistakes were made, and one of the most glaring of these was in bestowing the degree of Doctor on a graduate of a college course. Particularly was this true when it was given for one or two years' work in college with or without preparatory academic training. If the founders had had the guidance of university experience, the college work superinduced on the academy or high school preparation would have led to the degree of Bachelor of Dentistry, and after a specified amount of additional work under proper supervision, the degree of Master of Dentistry would have been added. Then as a crowning act in recognition of years of study or meritorious work done in the profession, the degree of Doctor of Dentistry would have been added. In this way outstanding merit and ability would have been recognized in the regular university manner. Instead of that, we now have the superlative degree conferred on the recent graduate, and, until of late, little attention was paid to his preliminary education. This makes the recent graduate equal, in the degree which he holds, to the ablest man in the profession, even though that man may have given years of efficient and productive work for the advancement of his chosen calling. There has been no way in which the dental profession could recognize such effort and ability, by reason of the fact that the highest degree in scholarship has already been conferred on the graduate in dentistry; and, holding the highest degree, it is not possible to recognize merit with a degree that is higher. It was with this thought in mind that the originators of the American College of Dentists decided to perfect an association with the threefold purpose (1) of recognizing meritorious work that had been done for the profession and for humanity by any of the members of the profession; (2) of encouraging men in practice to study and take up original research work, and (3) of stimulating students to higher ideals, and creating in them a desire to excel in their chosen profession, with the assurance that such excellence would be rewarded by a suitable recognition by the members of their own profession. These are the ideals which possessed the men who conceived the organization. There was to be no material or financial reward bestowed upon the successful man in the profession who attained to the distinction of recognition by the College. The conferring of fellowship in the College was to be given only to those who had attained to preeminence in their chosen calling; who had demonstrated their ability, scholarship and high professional standing to such a de-

gree that their right to recognition would not be questioned by any man. Such recognition coming from a body that was properly qualified to confer it would be honor enough for any man to aspire to with all of the power of his heart and soul. The fellowship would not be given for the seeking; on the contrary, such action on anyone's part would be prima facie evidence that he did not possess the proper professional and ethical qualifications to merit the distinction. This, then, is the ideal which brought the American College of Dentists into existence.

The thought that developed it was wrought out in the minds of the men who were at that time the leaders in the profession, by virtue of their election, by the members thereof, to the highest offices within their gift. They were fully aware of the criticism that would be aimed at them by the men who had not been selected to assist in the organization of a body of such pretentions. They fully appreciated the presumption under which they were laboring; but, appreciating the fact that, if such an idea was to be brought to perfection, someone would have to take the initiative, and conscious of the favor of the men who had exalted them to the positions they then occupied, they confidently took up the burden of the idea and attempted its completion, with the success which is now evident to all.

The original thought was wrought out in the minds of the then president of the National Dental Association, the president-elect and the secretary of the same organization, and the president of the National Teacher's Association, who were John V. Conzett, H. E. Friesell, Otto U. King and A. D. Black, respectively. After considerable thought and discussion, it was decided to invite twenty-five men of outstanding merit in the profession, from the different geographical centers of the country, to attend a meeting at Boston for the purpose of discussing the organization of such a body, and if the time seemed propitious, to begin the organization thereof. Pursuant to that call, all of the men invited accepted the invitation and either were present in person or regretted their inability to attend. The result of the meeting was a resolution to organize and the adoption of a tentative constitution and by-laws, which a committee appointed for that purpose presented at an adjourned meeting of the group, called together for the purpose of considering the advisability of accomplishing such an organization. The salient points in this constitution were: the adoption of the name of American College of Dentists; the establishing of conditions on which fellowship in the College would be bestowed, and the creation of a Board of Regents to carry out the intent of the College and a Board of Censors to examine critically the credentials of all nominees for fellowships.

In the Board of Regents was invested the executive powers of the College, and all of the business thereof was to be transacted by it. It was to confer all fellowships, acting, however, only on the recommendations of the censors. The Board of Censors was to be formed by the Board of Regents and was to be a secret body, nobody except the regents knowing the personnel of that board.

The Board of Censors, as before stated, is a secret body that passes upon all nominations that are presented to the College for fellowships. Any member of the College has the privilege of transmitting to the secretary of the College the name of any member of the profession whom he deems to be worthy of the honor of a fellowship in the College. This nomination is to be held inviolate,

not even the nominee having knowledge of his nomination. The secretary is to transmit the name and all available data concerning the eligibility of the nominee to the Board of Censors, whose duty it is to examine critically the accompanying data and all other sources of information open to them, that they may intelligently pass upon the merits of the case. This board is to be a secret board for the purpose of preventing any attempt to influence them in favor of, or against, any nominee, by friends or enemies thereof, and to insure the members composing the Board from criticism concerning any of their official acts. When a nomination is presented to the Board of Censors, it remains there, and if not acted upon favorably, it is not reported out. But if favorable action is taken, the Board sends the recommendation to the Board of Regents, which then orders the fellowship to be conferred upon the nominee, if he desires it and is willing to complete the nomination by signifying his willingness to abide by the conditions accompanying the bestowal of a fellowship in the American College of Dentists.

The entire thought in the development of the idea of the College is to so surround the fellowship that it shall only be given to men who merit it. It is better to make progress slowly, and the College prefers to recognize worthy men tardily rather than to fill the ranks with men whose professional activities would be a criticism to the organization. To this end many men of high professional attainments have not yet been tendered a fellowship, the College believing that the honor would be all the greater when it had fully justified its existence by its membership and the establishment of its ideals, rather than attempting a wholesale ingathering of men, many of whom might be found to be undesirable when the final test was applied.

The preliminary work has been accomplished. The organization has been perfected and is now functioning, and it numbers among its Fellows 150 of the picked men of the profession from the various geographical centers of our country. By virtue of its membership and high professional ideals, and the charter from the State of Illinois empowering it to do so, it is prepared to honor men in the profession of dentistry who have accomplished some really meritorious work for the benefit of their profession and, through their profession, for humanity, by bestowing upon them the fellowship in the American College of Dentists, with the privilege of adding the letters F.A.C.D. to their names as a token of the honor their professional brethren have conferred upon them.

In taking on themselves this function, the Fellows of the American College of Dentists feel that they have not trespassed upon the rights or prerogatives of any other organization or body of men; that their field and province is a peculiar and distinctive one, and that, in rewarding men who have labored for the advancement of dentistry and for the good of humanity, they are not only conferring a well-earned honor upon the pathfinders of the profession, but that such honor conferred upon men of outstanding ability will be an incentive to other men to attempt to climb the heights of scholarship and high professional endeavor. The College is therefore justified in its position as an organization in a peculiar field of endeavor, that being to honor the men who have attained; to encourage the scholar and scientist in researches and investigations, and to stimulate the student to higher efforts in his professional career.

The efforts of the College would fail were it to confer the fellowship upon men of mediocre ability or attainment,

and it must in some way demonstrate to the profession at large the fact that the Fellows of the College merit the distinction conferred upon them. To this end it has been proposed and definitely decided to publish a blue book of the College, in which all of the Fellows will be listed, together with their writings, scholastic attainments, beneficent inventions and all of their professional accomplishments. This will serve a two-fold purpose; it will demonstrate the fitness of the Fellows to the honor, and it will deter any from seeking it who are not able to comply with the requirements; for it would be more of an embarrassment than an honor for a person with no scholastic or professional background to be listed in the College blue book, with little or no work accredited to him.

It should be the ambition of every Fellow to seek out and reward the men who have attained, for it will be a worthy criticism against the organization if men of outstanding ability and scholarship should be passed by in the granting of the fellowship. The criticisms that it should seek to avoid should be that it is bestowing its honors upon unworthy men and that it is passing by men who should receive the honor. Either criticism, justly deserved, would spell the failure of the College to measure up to its ideals.

The College aspires to gather into its fellowship all of the men of ability and high professional attainments; to stimulate greater endeavor and more profound scholarship in the minds and hearts of these men, by the power of association with men of like minds; and, by its high ideals and consistent living up to these ideals, to stimulate a desire for the fellowship in the hearts of every member of the profession. If these ideals and aspirations are successfully followed in even a minor degree, the influence for good radiated from the College throughout the entire profession will be incalculable. These ideals are possible of realization and are in a fair way to success, but that accomplishment cannot be the work of the officers, the regents or the censors, though these men will have to bear the brunt of work of the organization. The ultimate success of the idea rests in the hands of the Fellows of the College. If every man becomes imbued with an enthusiasm for the ideals represented by the College, and bends his best efforts to those ideals, the influence thereof will grow by leaps and bounds, and the benefit which will accrue to the profession of dentistry, and, through dentistry, to humanity, will be greater than any man present can possibly imagine.

THE DENTIST'S CHANCE OF A LIFETIME

By H. L. ROCKWOOD, M.D., Cleveland, Ohio

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

UNDER present-day conditions, those active in public health administration have a keen appreciation of the important part played in the conservation of health and life by an active, efficient dental profession.

As far back as 1905, Cleveland began to take notice of the obvious needs for extending dental care to all as a health and economic measure, and began in 1906 to furnish in clinics free dental work for the worthy poor.

Much water has passed under the bridge since then, and today, as a result of countless studies and reports of dental inspection work, it is generally recognized that public health administration has an exceedingly serious problem in not only spreading the gospel of dental hygiene but in finding a sufficiently large group of men trained in dentistry to cope with these conditions which seriously menace the health of nearly 80 per cent of the children of America under 15 years of age and considerably more than 50 per cent of the entire adult population.

The subject of this paper is somewhat jocular in character. This enigmatic title has been chosen because of a desire to deal with a professional group on a very personal matter. Public health administrators recognize the importance of maintaining high standards of performance and efficiency in the dental profession because of the vast number of the population which has already been shown to depend on the efforts of this professional body for health, and in many instances for life itself.

The future will tell us more than we know today of the relationship between mouth hygiene and general health, but there is now adequate scientific proof that the bodily economy of man is dependent for hygienic existence on teeth free from infection and caries, and teeth able to function properly in their relation to the digestive processes. We are today confronted with an increasing number of cancer deaths, over 40 per cent of which are alimentary in origin. We note a rate of death due to cardiac diseases which exceeds all other single causes of death. A multitude of those living suffer the effects of arthritis. The toll of tuberculosis still continues to be terrific, and in the last few years the mortality rate of the pneumonias has exceeded that of tuberculosis.

In each of those conditions, from the standpoint of etiology, or from the standpoint of overcoming the inroads of disease as in the case of tuberculosis, we realize that oftentimes one of the chief factors deciding whether or not disease shall invade the body or whether health shall prevail in the physical state of the mouth and throat as influenced by the condition of the teeth.

Dental Profession a National Resource

Recognizing as we do the tremendous importance of dental care, and realizing that the only way of providing such care must be the continued and efficient service of great numbers of men well trained in dentistry, it is of the utmost importance that this resource of the nation in public health be fostered and nurtured, and that we give careful attention to the conservation of this professional group.

Conservation has both its economic and its physical phase. The economic welfare of the dentist is not entirely foreign to my subject, for "health is wealth," but overtopping that phase of conservation which deals with the economic welfare of the dentist is the necessity for keeping him in such a state of health that he may, for a full professional lifetime, do his work efficiently and render the service which the entire commonwealth requires in order that men may live normal lives and be rescued from untimely decrepitude and premature death.

Physical Welfare of the Dentist

And so it now is apparent that I wish to dwell on the personal physical welfare of the dentist, and I am speaking fraternally on the subject. The same factors in physical welfare which affect the dental profession to a large extent affect the medical profession. In each group all are adults, and, up to the present time at least, most are men. In both medicine and dentistry we shall see an increase of women in future years. For the present at least, those matters which have to do with the health of adult men living fairly sedentary lives by occupation, and usually in thickly populated areas, present the chief points for consideration here.

Density of Population and Bacterial Infection

The fact that the average dental office will be found in the midst of large centers of population has an immediate effect on the odds at which most of the dental profession must play the health game. Unlike the old lady who thought it providential that large cities were located near streams or bodies of water, we readily understand why both dentists and doctors are most commonly found where the special relations of human beings are reduced and people are in close commercial and residential contact. These conditions tend in all cases to increase the communicable disease rate for all, and the dentist, to maintain his physical welfare, must reckon with these odds of the game.

No unreasonable fear of bacterial infection from other human beings should prevail. I have known of tuberculosis patients who were turned away from dental offices because of the fear of the dentist that he might contract tuberculosis. That such a fear should prevail to the point of excluding those patients known to have tuberculosis is quite unreasonable in the light of our knowledge that between 1 and 2 per cent of the entire population is actively tuberculous at all times and that fully 70 per cent of the entire population has received at some time or other a tuberculous infection. I shall have more to say regarding tuberculosis presently, but in this, as well as in all other diseases of bacterial origin, protection of the dental attendant should depend on a thorough knowledge of the principles of asepsis. We must conclude that a dentist or doctor who runs away from a tuberculous case has so little confidence in his own knowledge of asepsis as to make it doubtful if he is competent.

On the other hand, we must admit that not alone from the standpoint of pathogenic organisms there are some elements of chance in the entire game of keeping in good health. There are

always some health hazards due to conditions beyond one's control. For this reason, public health administration—municipal, state, national and international—is being developed. The factors which make health a game of chance are yearly becoming more limited to matters within the control of the individual. Even the number of persons struck by lightning is relatively less today than twenty years ago.

Heredity as a Factor in the Health Game

While inheritance of bodily and physical traits unquestionably has an important bearing on our health, and there is at present no known method of choosing our ancestors, there are exceptions where it is possible for some of us to play the health game successfully although handicapped by inheritance. One exception is when there exists a definite history of tuberculosis in some of the more recent branches of the family tree.

Tuberculosis

For the dentist who has a definite family history showing the presence in his family of one or more recent members who have been afflicted with tuberculosis, one of the first rules constantly followed in conserving that man for the dental welfare of the nation should be the practice of the fundamental preventive measures for warding off the development of pulmonary tuberculosis. Our knowledge of tuberculosis has increased immeasurably in the past twenty years, although there is plenty that we do not yet know about this disease. We are certain today that in those cases that develop, in most instances, the seeds of infection were sown early in life, usually owing to the association with other members of the same family or of the same household. We are so sure of this that it is unquestionably important for the dentist with such a family history to proceed through the first twenty years of his dental career as though the seeds of infection have actually been sown, whether or not this may be the case. His rules for playing the health game will be such that he will adopt a routine of life maintaining for him the best attainable state of nutrition adapted to his age and height, as shown by the authoritative tables. He will avoid those factors which fan the dormant spark of tuberculosis into activity. Fatigue, overheated and poorly ventilated offices, long hours out of bed, and acute infectious diseases are chief among these factors. A man with a known tendency to tuberculosis should not work nor should he play until he is fatigued. He should not fail to realize that rest in a reclining position in outdoor air is needed by him more than by other persons. If he develops a common cold, influenza, bronchitis or any other acute respiratory infections, his care and convalescence should be most carefully watched. For years the deaths due to tuberculosis in the United States have approximated 10 per cent of all deaths. By the same reasoning, 10 per cent of the entire population today will die from this cause. Each year our mortality statistics record the untimely death of one or more members of the dental profession from this disease. Those who need it should be on their guard in these particulars in playing for health.

Obesity

Another exception concerning inheritance through the family tree of tendencies which bear on one's physical welfare is the tendency to obesity. Elsner stated that 36 per cent of all cases of obesity have heredity as a definite etiologic factor. For men who through occupation are of sedentary life, obesity, whether inherited or acquired, becomes a definite health menace. When the tendency to overweight is inherited, bodily activity through work or exercise is not the effectual remedy it proves to be when weight is acquired by overeating or through sluggish habits. In

a recent report by the United States Public Health Service, body weight and long life are shown to have definite relationships, and a dentist over 35 years of age who is overweight is more of a hazard for the life insurance companies than when of normal weight or slightly under. That this is no fiction is shown by tables of a large insurance company which prove that among short men, that is, those below 5 feet 7 inches in height at the age period of from 40 to 44 years, a 20 per cent excess of weight involves an added mortality of 30 per cent above normal; and if the overweight amounts to 40 per cent, which is not so likely among dentists, the increased mortality is nearly 80 per cent. And for tall men, say over 5 feet 10 inches in height, overweight is still more serious; 20 per cent excess among those between 40 and 44 years of age means a 40 per cent increased mortality, and a 40 per cent increase in weight for the group doubles mortality.

As a matter of fact, those who weigh 10 or 20 per cent below the average for age and height when beyond the early stages of adult life show the greatest length of life. Below 30 years of age the lowest mortality is found among those who weigh 10 pounds more than the average; above 30 years the reverse is true. At 50 years, the best weight, as shown by mortality figures, is, generally speaking, from 30 to 40 pounds below the average weight among men of this age.

Death and incapacity for work, when these are brought about by years of carrying an additional burden of flesh, are due to organic changes, particularly changes in the structure of the heart and kidneys. Goldthwaite has shown that men (including dentists) are of two types as to general bodily build: those who are long, lanky and supple and known as the carnivorous type of bodily build, and those who are shorter, stocky and less agile, known as the herbivorous type. Obesity in these two types requires quite different management, and the dietary factor in reducing excess weight differs in each. Obesity is dangerous to life because this condition requires greater effort of the heart muscle in its work of maintaining circulation for the nourishment of all bodily tissues. If these bodily tissues exceed in quantity the amount for which a given dentist's heart was intended to supply with blood, human life is shortened and death before maturity of a dental career intervenes. In the same way, regardless of length of life, efficiency is lowered. Other things being equal, the fat man cannot measure up in accomplishment with the man who gives attention to the relationship of age, height and body weight.

Environment as Related to the Dentist's Health

Passing from the subject of inheritance and the part played by heredity in the health game, environment becomes a most important topic for consideration. Environment affects us all, and its importance is particularly obvious when we happen to be a member of a large group of society, such as is the case with those of us who dwell in cities or large communities.

It is difficult to state just how much improved environment has meant in the promotion of health, but it is safe to say that, for the dentist, the environment of today has brought safeguards which immeasurably promote efficiency through a better state of health and which unquestionably tend to promote longevity. The dental office of today has a very different environment for the professional man than the dental office of some thirty or forty years ago. Modern sanitary plumbing, electricity for lighting and power, modern building construction with attention in natural light, larger windows and better ventilation—these changes have given the dentist a better chance in playing the health game while practicing his profession. The dentist's en-

vironment in his office today, if the office is wisely chosen, may be said to guard him effectually against the onslaughts of all of the major infectious diseases, save one. This disease is syphilis.

Effectual safeguard against syphilis requires adequate knowledge on the part of the dentist of the signs of the disease, and it is important for men in dentistry to know the lesions of syphilis in the infectious stage. More than one man has found, creeping on late in life, the symptoms of general paresis or of locomotor ataxia due to syphilitic infection acquired through contact with an infectious mouth while rendering dental service. More than one dentist has suffered and undergone long treatments before successfully overcoming an infection of syphilis so acquired.

It is up to every dentist to take advantage of modern facilities for sanitary environment, and there is no excuse for the conditions which actually exist even at this date in lack of proper sanitation about some dental offices.

The welfare of his patients and the welfare of the dentist himself are both concerned in this matter, and the neglect to take advantage of the opportunity to protect successfully against disease by a modern environment of proper sanitary facilities, including proper lighting and ventilation, is an unpardonable error in playing the health game.

Personal Hygiene in Maintaining Health

This reference to the occasional dental office where there is evidence of sanitary neglect leads from the subject of environment to that of personal hygiene. Oftentimes lack of attention to sanitation in and about the premises is at least an indication of similar tendencies about the person. Personal habits are important factors in determining health or disease. Most habits, if formed at all, are formed in early life. There is a saying, "You cannot teach an old dog new tricks." You dentists know this, and you insist that children be given toothbrush drills and early instructions in proper dental habits. This you do because you know that such habits must be acquired early or not at all. The same line of reasoning applies to personal hygiene where habit or habitual performance is necessary.

Conservation of Vision

Applying this personally to the professional group, there is one habit of tremendous importance in maintaining professional efficiency. In the same way, this habit early acquired will certainly stave off premature old age. This habit which every dentist should acquire and constantly practice is the conservation of vision.

Few of us stop to work back from effect to cause in the incidentals of life, although in our professional work we are trained to do this constantly. A friend of mine who has entered the twilight of life told me that his wife called some food stains on his vest front "old man spots." We all recognize as signs of advancing age in persons we have known intimately what appears to be a less scrupulous care of dress and personal hygiene. The cause of these changes by which we often misjudge our associates is to be found, I am satisfied, in the great majority of cases, in impaired vision. The spots on the old man's vest do not mean that he has any lessened regard for his appearance nor that he is consciously becoming careless of hygiene, but their presence indicates that the eyes no longer focus well on near objects. The same man no longer reads as much, and when he does read, he picks out the articles in coarser type or reads just the headlines. It may be that his dental instruments show "old man spots" in the same way, and there are more cobwebs and dusty corners about

his place of business. Certain it is that for the efficient practice of dentistry, good eyesight is always necessary, and eyes that can recognize such minute details as are necessary in efficient dental work must be properly conserved.

Over 88,000 cases of defective vision were found among approximately 3,000,000 men of army age during the world war, a rate of nearly three per hundred men examined. Only 8 per cent of these men were absolutely rejected, and the chief cause of rejection was myopia, or short-sightedness. A moderate case of myopia is not sufficient cause for rejection from the profession of dentistry, although for military reasons such a case might not qualify for army life. The continued accommodation of the eyes of the dentist through years of service to close work is, however, a sufficient reason for sounding a warning for conservation of these organs of vision for the entire dental profession, that their years of usefulness may not be unduly shortened.

Presbyopia is the term applied to the physiologic changes which occur in the eye as age advances. The normal tendency is for hyperopia, or farsightedness, to increase. As this change occurs for those doing close work, the accommodation muscles of the eye are called on to function over longer periods and under greater stress. Fatigue or eyestrain results. Such conditions produce a "fagged" or worn-out feeling, more headaches than before, and sometimes the disposition becomes irritable and marital troubles may transpire. After the age of 40, or even before, every dentist should have his eyes examined by a competent oculist.

It is apparent that vision is not the test for deciding whether or not glasses are needed. Owing to the accommodation reserve, it may be possible to focus well enough to see perfectly, and the results of fatigue and eyestrain are often already present before the aid of properly fitted lenses is sought. And another important point is the need for reexamination at intervals of not more than three years after the age of 40; for lenses fitting well today may not serve the purpose of relieving eyestrain three years hence when further presbyopic changes have occurred.

Tobacco

Inordinate use of tobacco is rare among dentists. A moderate use of the weed is common. I make these observations from a large acquaintanceship among the profession. There is this to be kept in mind in regard to tobacco in playing the health game—nicotin is an alkaloid. Alkaloids generally increase the blood pressure when taken over a long period of time in small amounts. The dentist who has a tendency to cardiovascular changes must reduce his use of tobacco to near the vanishing point, as the length of his career increases if he plays the health game wisely.

Conclusions

I have reached the conclusion of this well-intended and, I hope, not too lengthy exhortation to conserve the health of you dentists for a long lifetime of usefulness in your chosen profession, and I have left the trump card in the game until the last. As dentists, you are scientists. You believe in the classification of knowledge. Would it meet with your approval if dentistry should revert to empirical practices? Would you be satisfied to undertake the care of a patient on the old methods we doctors used so long, such as bloodletting, blood purifiers, uric acid solvents, etc.?

Nowadays we demand that "gun shot" prescriptions be abandoned and that therapeutic methods be the orderly procedures indicated by the diagnoses. This is the scientific method of practice. A neuralgia is not only treated as a painful sensation, but its cause is

sought and remedied according to scientific principles developed through years of research and study in both medicine and dentistry.

The trump card in playing the health game consists in having the most accurate knowledge at all times of personal physical condition. This means a periodic physical examination. We are financiers enough to consult our bank accounts occasionally to ward off possible overdrafts. Why not estimate our physical resources at regular intervals? Is it scientific to run to the oculist when our eyes bother us, and to the lung specialist when we cough, or to the heart expert when we have cold feet? Certainly the health game can be played in this manner and with a fair degree of success, but why play against odds in this game? Why not play trumps and win? The chief argument against having a regular physical examination seems to be the argument of the ostrich who shuns the enemy by hiding his head in the sand. Many shun a physical inventory on the theory that "no news is good news." This method of dodging the issue until too late is a boon to the undertaker and has its result in the dental profession in shortening the period of efficiency.

This unreasonable fear of physical examination is fundamentally wrong. It is a result of the negative conception of health. Health should not be measured in terms of disease. The dentist should not take the position of playing the health game to avoid disease, but, on the other hand, he should sit in this game to win more health. It is only a relative term, and as used, health may mean much or little. Some dentists, and doctors too, do not know what health really may be, and yet they consider themselves in good health. It is the aggressive "go get it" attitude that we need in this matter.

Our population is known to need the services of many more men than we find in the dental profession today. It is the duty of every dentist for humanity's sake, for the nation, and for himself to play the health game to win.

Discussion

W. H. Whitslar, Cleveland, Ohio: The preservation of health is of great importance to us, as we all know. We can perform our service better when we are in good mental and physical trim. Some people have to exercise—they have to play golf; they have to do other things, such as going to the gymnasium, and so on, but for others it is not necessary. I am one of those fellows who thinks that golf playing is unnecessary because up to the present time I have been in good physical condition and yet I never take any special exercises. There are a few, however, that I have found very valuable. I have discovered a very simple way of keeping the stomach in, as the saying is. It is so simple that you cannot get away from it. It is simply raising the arms above the head, locking the thumbs together; then pull your hands back as far as you can get them and that pulls your abdomen in so that you have no stomach at all. The muscles of the back pull your abdomen right in. This is one of the most valuable things I have ever known. Another little thing that is very useful to keep the circulation going is this. Many of us as we grow older get a little stiff in the knees, and we cannot get down quite as easy as we used to. Place your hands upon the bathtub, if you like, and go down to a squatting position, and do that fifteen or twenty times. If you do this, the first thing you know you will find the blood going into your arms and head, and so on. You do not need any special exercises. Those two things I have mentioned will make the blood flow freely. Of course, golf playing, shooting, tennis, etc., are of great value to the dentists. We have got to get away from our offices. We should try to keep a proper position in doing our operating. Many dentists do not elevate the chair to the proper position. The head of the patient should be about at or a little below the level of the shoulder of the dentist, otherwise you will find him making awkward movements. The result is that his shoulders are brought over, his lungs are cramped, and he does not have a chance to breathe. He should learn to operate by holding himself erect and breathe properly.

W. F. Faust, Milwaukee, Wisconsin: There is only one phase of this paper I wish to touch on, and that is the subject of syphilis. I have had an observation and practice of thirty-five years. Those of you who have

graduated that many years back know that the subject of syphilis was very little spoken of in our teachings. As good luck would have it, I have a relative who is a physician, and he gave me more information on that subject than I ever heard of before. In my thirty-five years of practice I have been fortunate enough to have only six syphilitic cases. In large cities we look for them, but in smaller communities we do not so much. I generally look for them among the lower classes. At one time I had a young woman, 28 years of age, from one of the best families of Milwaukee, come to me. I never suspected anything of this kind. Looking into her mouth, I saw a little ulcer. She was told by her physician to go and see her family dentist and also tell him what was the condition. Naturally a patient of that class does not wish to tell you what is the trouble, but I saw the ulcer in the mouth.

We as dentists cannot be too guarded against that dread disease. I have in my office at all times rubber coats and rubber gloves just for cases of that character, and I advise every dentist who has never taken that step to do so just as soon as he possibly can. You are liable to spread the disease to your patients if you have a case of this kind, if you do not handle it properly, and you are liable to become infected yourself. It will be three weeks before you will know it.

W. R. Clack, Mason City, Iowa: When a young man, I was constantly told I was almost sure to die of tuberculosis because six of my family had. Later, at school sixty-three were examined for life insurance. Three of us were rejected. Today, the three of us who were rejected are sturdy, rugged old chaps. We have helped to bury nearly all the other sixty. I was several times rejected by old line companies, the cause being "family history".

Forewarned, forearmed, I am almost 72 years old and work eight hours a day at the chair, but I do not work stooped over from behind the chair. I stand in front of the chair, with the chair up so that I can stand upright and work by direct sight. My lungs are like blacksmith's bellows.

Let no one despair because a child is underweight, round shouldered, and of tubercular diathesis. Instead of keeping him in ignorance of his condition, tell him about it, and tell him what to do to avoid the consequences.

The school nurse is saving the lives of many children. Better that a boy break his neck in a football game than to linger along for years, poisoning the air with every breath he exhales and finally dying of tuberculosis.

There is no reason why the dentist should not live to a good old age. The hours are not necessarily long. If he cannot ride horseback, or play golf, he can buy a cord of wood, a sawbuck and a bucksaw, and by playing with that for half an hour, he can rid his lungs of the last atom of vitiated air that he may have inhaled in the operating room.

Edward C. Mills, Columbus, Ohio: During the past few years we have dwelt much on the importance of the teeth in relation to the general health. Many of us, in our efforts to conserve the health of the laity, have done so greatly to the neglect of our own physical welfare. We have forgotten that we are by no means immune to physical ailments.

Dr. Rockwood's paper sounds the keynote of warning to those who have heard the valuable suggestions he has given, and if we will heed it and adopt his precepts, we shall live much longer than the men who failed to hear the paper and who are thus deprived of its splendid advice.

Dr. Rockwood, (closing): I was interested in Dr. Whitslar's point in regard to the exercises which resemble very much the popular "Daily Dozen". An important point which Dr. Whitslar forgot to mention was to hold the breath in while taking the exercises and to hold the arms over the head, because that keeps the diaphragm rigid and puts the pressure on the abdominal muscles; thus one gets that much more out of the exercise.

HARD TISSUE CHANGES NOTED WITHIN THE CANALS OF TREATED TEETH, AND THEIR POSSIBLE SIGNIFICANCE

By WM. G. SKILLEN, D.D.S., Chicago, Illinois

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

CONTEMPLATION of the many methods and ideas surrounding the treatment and retention of teeth in which the pulps are in some way involved committed us some time ago to the task of studying the situation at first hand.

The subject presented here is a part of the general scheme we outlined at that time from which we hoped to be able to determine, to some degree, the status of those teeth which present with uncertain histories, as well as obtain aid in mapping out a more definite plan of procedure for the laboratory and the clinic. It should be clearly understood that the conclusions which may be drawn from this part of the work are tentative, pending further examination of conditions existing in and about the apexes of like teeth.

To make this study and those which are to follow later, we collected two groups of treated roots: Group I consisted of 250 successfully treated roots; Group II consisted of an equal number of failures. Successful and unsuccessful cases were judged by the radiogram. To assure as varied a technic as possible under the circumstances, specimens were collected from a number of practitioners as well as from our own clinic. The teeth comprise all types, including the third molar. The types, however, do not run even in numbers since, especially in Group I, we had to be satisfied with what we could get. They range in age from 11 to 60 years, with the greater number, however, ranging between the ages of 30 and 50. This was especially the case in Group I where the prevailing reasons for extraction were for prosthetic purposes or on account of periodontal infection. Indeed, so many of this group, 60 per cent to be accurate, presented with periodontal infection that we considered it wise to make a check against the effect of this disease on the tissues within the tooth. About fifty additional teeth showing periodontal involvement only were therefore examined. All of these teeth exhibited secondary dentin to some degree or other, but this was of the tubular variety, not very extensive, and might well be considered the result of age or abrasion. We feel, therefore, that periodontal disease may be disregarded as complicating the picture of the hard tissue conditions within the treated tooth.

Caries as a complication was also considered, so an examination of about fifty more teeth so affected was made. About the same condition as described above, with in some cases pulp stones, was the usual arrangement found. In one case, however, discovered by Dr. Ploché, an extensive lacunar or cemental deposit was found, a type of deposit described by Davis[1], Grove[2] and Hatton[3] as apparently characteristic of the treated tooth. This question, however, may be

determined with fair safety by noting the relation of the changes in the canal to the root filling and the soft tissue.

Root-Filling Conditions

Of the 250 roots in Group I, fifty-eight were judged as having good root fillings and 192 as having poor ones. In Group II, there were forty-six good and 204 poor root fillings.

Fig. 1.—Mesial canal: *x*, lacunar type; distal root similar to Fig. 7; *P*, pulp. (hematoxylin and eosin) Tooth of patient aged 26, which was treated twelve years previously, and removed on account of periodontal infection.

The basis on which these conditions were judged are fairly well represented by the radiogram in Fig. 11. The lateral here was considered as having a poor filling. The centrals were considered good and set the limit, very nearly, as to what constitutes a good filling. Overfilling was considered a poor filling. Almost 40 per cent of the poorly filled roots could be considered as cappings rather than fillings. Most of these, of course, occurred among the roots in which the canals are naturally constricted and to which access is usually difficult. But considered in the light of what a careful technician can do even with these very constricted canals, and

Fig. 2.—Central incisor: *x*, foramen, no calcification; note vessel; *A*, lacunar deposit, similar in all teeth from same case. (H. and E.) Tooth of patient aged 38, which was treated ten years previously, and removed for prosthetic reasons.

and by what has not been accomplished in the way of filling many of the more accessible canals, the technic as a whole, in the majority of these specimens, must be considered as very low grade.

Preparation of Specimens

All specimens were prepared for microscopic examination by being fixed in formalin and subsequently decalcified in nitric acid. For sectioning, some roots were embedded in celloidin, others frozen, or, as was frequently done, parts of one root were sectioned by both methods as a check. All sections were cut transversely and so arranged in watch glasses that practically a serial arrangement was obtained, an important consideration when dealing with an object so varied as the root end. With this arrangement, any foramen could be followed through its full length.

Hematoxylin and eosin, and Schmorl's techic (thionin and picric acid) were used to stain the sections. Frequently, alternating sections of one root were stained by both methods so that a comparative picture of the soft tissue developed by the former combination of dyes, with the hard tissues emphasized by the latter, might be had.

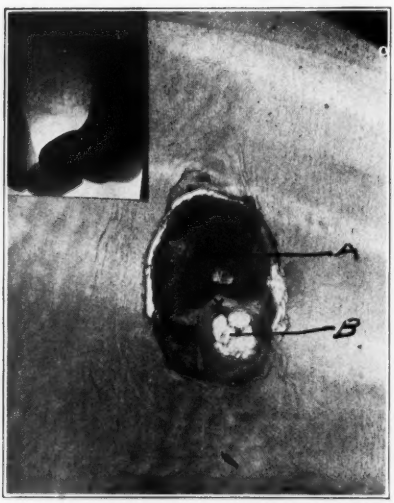

Fig. 3.—*x*, calcification between filling (*A*) *and pulp (B)*; lacunar type. (H. and E.) Tooth of patient aged 30, which was treated two years previously, and removed for systemic reasons as a doubtful case.

Fig. 4.—*A*, tubular type of calcification; *B*, dentin; *C*, cementum. (Schmorl). Tooth of patient aged 38, which was treated fifteen years previously, and removed for systemic reasons as a doubtful case.

Features Noted

The hard tissue features noted, which apparently may be considered a sequence of pulp treatment, were calcific deposits of various kinds, resorption, and a few miscellaneous conditions. In addition, a word must be said regarding those cases in which the hard tissues were not affected. Each of these conditions will be taken in turn.

Calcific Deposits

Calcific deposits, which seem to be a sequence of pulp treatment, were found in 330 of the 500 roots examined. Of this number, 184 fell in Group I, and 146 in Group II.

Various types of deposits, the most common of which may be seen in the

illustrations, were found. A lacunar or cemental type (Fig. 6), a tubular type (Fig. 4), and a homogeneous variety occurred. Occasionally, these types would be mixed, or they would occur in alternating layers. Sometimes one type, for instance a tubular, would give way, farther down the canal, to a cemental type. The cemental type, however, as

Fig. 5.—Lacunar type breaking pulp up into many parts; *x*, artifact at junction of old dentin (*A*) and new deposit (*B*); *C*, cementum. (Schmorl). Tooth of patient aged 35, which was treated five years previously, and removed on account of periodontal infection.

Davis, Grove and Hatton have indicated, predominated. The nearer the apical end the more pronounced in type, usually, did this variety become.

Usually the deposit bordered the canal in a more or less regular manner (Figs. 2, 7 and 8). Occasionally its conformation was very irregular either over a part or all of the unfilled portion of the canal (Figs. 1 and 5), in which condition, islands of pulp tissue more or less separated from each other were formed. Where pulp tissue and root filling came into contact, usually a wall of hard tissue had been formed to separate the two (Figs. 3 and 9).

Whether or not these deposits were in the process of formation at the time the teeth were removed will not be

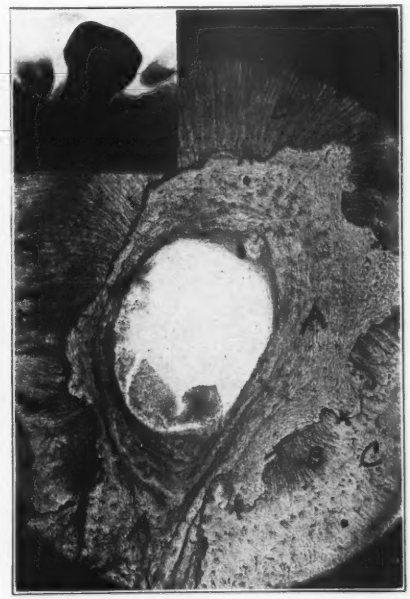

Fig. 6.—Lacunar deposit (*A*) joining resorbed border *(x)*; *B*, dentin; *C*, cementum. (Schmorl.) Tooth of patient aged 39, which was treated ten years previously, and removed on account of periodontal infection.

known, at least until an examination of the soft tissue is made.

The greatest interest, of course, in the subject of calcific deposits since Davis brought it up lies in the hope that Nature will do what, apparently, we are unable to do—make a perfect root filling and thus remove a possible source of subsequent infection. Both Davis[1] and Grove[2] indicate the possibility of this happening; the former in his statement

that 10 per cent of the roots examined by him (number not stated) were completely calcified, and the latter by reporting at least one case, the illustration of which appears to show a completely obliterated canal.

We regret that we cannot corroborate these writers in this respect, a regret for which the reason is obvious. In not a single instance of the 500 did we find a complete closure of either a canal or a foramen. The nearest thing we were able to find is illustrated in Figs. 4 and 5. Indeed, in a number of instances, although the canal was considerably constricted by the deposit, the foramen or foramina were proportionately large, as may be seen in Figs. 2 and 6a.

It would seem, as an examination of the illustrations indicates, that the extent of the calcific deposit was limited by the blood vessels; that is, most of the soft tissue, for instance the pulp tissue proper, may be encroached upon or transformed into calcified tissue, but an approach within a certain distance of the vessels stops the formation and they are left intact (Figs. 2, 4, 5 and 9). Time apparently could not have been a governing issue in the failure to find completely calcified openings, as 32 per cent of Group I, the successes alone, had been treated anywhere for from ten to twenty years previous to their removal. The trouble may have been due to the fact that we did not obtain a sufficient number of cases at the right time which would meet Grove's[3] theoretical requirement, with which we are more or less in accord, that at least all pulp tissue must be removed and removed without injury to the remaining tissue. If the vessels are the obstruction, then leaving but a very small portion of these, with

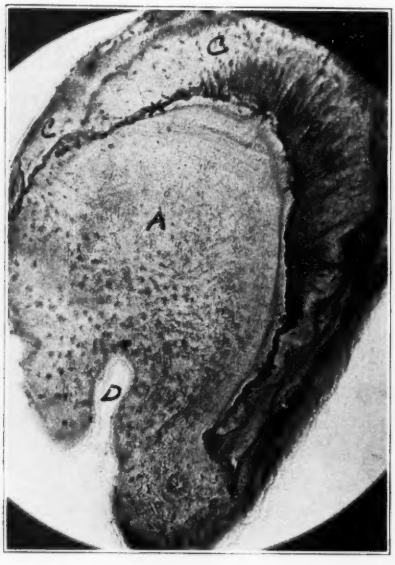

Fig. 6a.—Apex of tooth shown in Fig. 6.

Fig. 7.—Mesio-buccal root: *A*, lacunar deposit. (Schmorl). Tooth of patient aged 50, which was treated twenty years previously, and removed for systemic reasons as a doubtful case.

practically their need gone, might lead them to atrophy or enable them to be pushed aside and redirected during the formation of the calcific deposit.

We do not contend that complete obliteration is an impossible happening even in cases such as we deal with here, but apparently it is of infrequent occurrence and should not, it seems to us, be relied on as a cure-all at the present time.

Fig. 7a.—Disto-buccal root, lower down than shown in Fig. 7.

Although calcific deposits did not control the success or failure of these teeth, it does indicate that a more or less vital tissue persisted for a greater or less time. And frequently, it must have persisted against the odds of apparently very poor root-canal technic. It becomes interesting, therefore, to guess what made the 146 cases in Group II subsequently fail.

A study of the soft tissue in the successful ones, or others, at the right time and with good histories attached, may possibly give the answer and prove us wrong when we hazard the guess, not entirely unfounded, that in some cases, at least, failure was due to infection being carried in from some distant or local point by the circulation. This guess develops an interesting line of thought somewhat at variance to the more general theory of the relation of the tooth to focal infection, but at the same time possibly indicates that the region of the root canal is in a state of already lowered resistance and therefore due itself to fail.

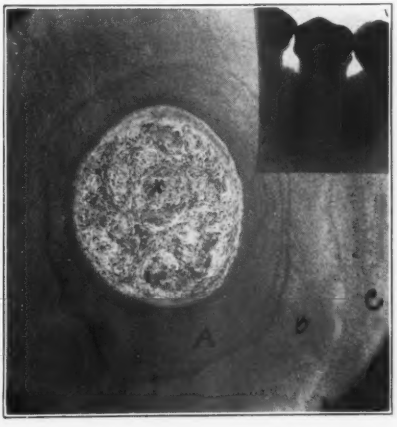

Fig. 8.—*D*, distal root; *A*, lacunar deposit; *B*, dentin; *C*, cementum, *X*, pulp. (H. and E.) Tooth of patient aged 39, which was treated with arsenic ten years previously, and removed on account of radiolucent area on mesial root.

Resorption

Resorption to a greater or less extent seems also to be frequently a sequence of the inflammatory reaction aroused in the soft tissue of the canal by the treatment. The amount of resorption varies within a wide range, from a few Howship's lacunae to the removal, sometimes, of nearly all the dentin. The presence of these lacunae and the cells show the process to be of an osteoclastic character.

Very frequently resorption precedes the deposition of the new calcific tissue, as in Figs. 5, 6 and 6a, in which it has been very extensive, and in Figs. 2 and 7a, where it has been slight. In Fig. 2, although calcification has followed resorption in the canal, it has not done so in the foramen, and hence this is rather large.

Fig. 8a.—*M* of Fig. 8, apex of mesial root; *A*, dentin; *C*, cementum; *X*, necrosis.

Resorption alone (Fig. 11) was the only change noted in seventy-seven of the 500 cases, forty-six falling in Group I, and thirty-one in Group II. There is no difference between the histories of these and many of those in which calcific deposits were found, so just why this condition should exist cannot be explained. Possibly here, too, an examination of the soft tissue may give the answer. It is realized, of course, that different stages of inflammation will give rise to different effects, and this may be the reason for the condition. But it does not explain the apparent persistence of the condition, nor indicate its status.

Unaffected by Treatment

In ninety-three cases, the normal hard tissues had not been altered. The greater number of these, seventy-three, fell in Group II, so were due likely to the immediate or even the previous dissolution of the soft tissues. Dissolution might have been due to infection, trauma or a combination of the two. The fact, however, that many of these occurred in those roots having characteristically large canals and which were well filled indicates that trauma or trauma and infection combined was the cause of failure more often than not.

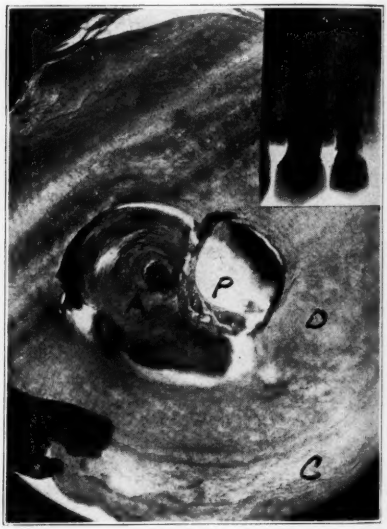

Fig. 9.—*X*, root filling; *A*, calcific deposit; *P*, pulp; *D*, dentin; *C*, cementum. (Schmorl). Tooth of patient aged 28, which was treated ten years previously, and removed for prosthetic reasons.

A study of the soft tissue must be made of those cases which fell in Group I before any treatment can be made

with safety. We might expect, however, to find these normal or very close to normal.

Miscellaneous Conditions

In several instances, the two or more teeth which were obtained from the same mouth all ran alike, so far as the hard tissue conditions were concerned. For example, if one showed resorption (Fig. 11), they all showed the same condition; or, if one was free from change, the others were also. Figure 2 shows five teeth in which a cemental deposit was found, all being very much alike, and Fig. 11 shows three in which resorption alone was a characteristic. Possibly systemic conditions might be seen as an influence here.

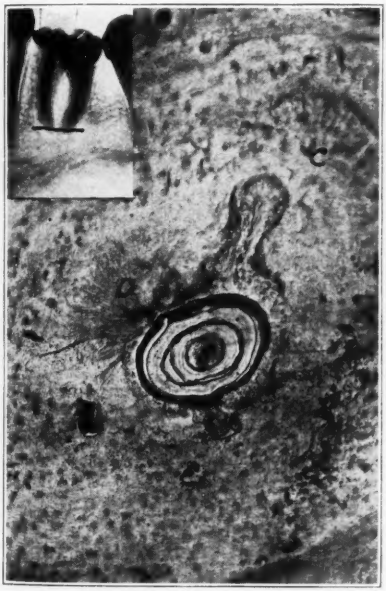

Fig. 10.—*P*, pulp surrounded by rings of cemental deposits; *D*, dentin; *C*, cementum. (Schmorl). Tooth of patient aged 19, which was treated one year previously, and removed on account of apical radiolucency.

One case, a lower first molar from a patient 45 years of age, presented with a history of having been treated twenty-five years previous to the time of removal, which was caused by the development of an acute abscess subsequent to an attack of tonsillitis. Examination showed that the mesial root had been well filled, and the distal practically not at all, both, however, revealing a cemental deposit similar to that in Fig. 7. Does this indicate a tissue of low resistance subject to dissolution, or a healthy tissue made susceptible by the general lowered vitality of the body?

Fig. 11.—*x*, root filling; *P*, pulp; at *O*, osteoclasts. Other teeth similar. Tooth of patient aged 21, which was treated four years previously, and removed for prosthetic reasons.

Another case (Figs. 8 and 8a), which is possibly more interesting than instructive, presented, as the radiogram shows, with a radiolucent area about the mesial root and an apparently healthy distal

root. The illustration shows that the canal of the distal root is bordered by a layer of cemental deposit which had been preceded by a slight resorption, while in the mesial root an extensive internal necrosis of dentin and cementum had been going on. This case was of a patient 36 years of age. Treatment had been performed in which arsenic was used ten years previous to the removal of the tooth. A series of radiograms here, as well as in many of the cases, would have been invaluable.

Summary and Tentative Conclusions

Calcific deposits in these cases, although found in abundance, did not control the success or failure of the treatment. But its presence indicates the persistence of soft tissue (pulp), whose quality must be determined by examination. And until this examination is made, watchfulness should be the password during the retention of these teeth, especially at times when the whole system is suffering from lowered vitality.

If closure of the canals or foramina by calcific deposits, as it seems, is due to the vessels retained in the pulp tissue resisting its advance, then the more tissue removed from the canal with the avoidance of as little trauma as possible, the greater the hope of repair. However, the vitality of this terminal tissue must, by all means, be preserved. At any rate, this is reducing a possibly susceptible tissue to a minimum.

Subsequent failures at least, may be due as often as not to infection brought in by the circulation, but undoubtedly a large number of failures are due to traumatism.

And lastly, a study of specimens in which a definite technic has been employed and a careful history kept would go far in solving this questionable problem.

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2. Grove, Carl J.: Some Causes for Periapical Infections with the Pathology, *J. N. D. A.* 6: 669, 1919.

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Discussion

Edward H. Hatton, Chicago, Illinois: In discussing Dr. Skillen's paper, I shall call your attention to just four points: 1. Adolph Witzel in 1873 described similar changes in pulps after partial fillings. 2. At the present time this subject of calcification after partial filling of the pulp canal or chamber is being actively studied by the Swiss, largely under the leadership of Gysi and Hess. 3. I am convinced that secondary infection of the periapical regions of teeth from infections elsewhere in the body is more common than dentists ordinarily believe. 4. In discussing the results of similar investigations, I am satisfied that I overemphasized the frequency of the occurrence of solid cores of calcified material extending from the apex to the apical end of the filling.

R. M. Seibel, Kansas City, Missouri: I would like to ask a question as to whether Dr. Skillen has had any experience with a reflex of some of these pulp zones that we find in teeth where the roentgenogram shows no infection and yet that have the calcific deposits with considerable reflex pains.

William G. Skillen: That effect might be indicated in the soft tissues which we have not studied yet. We are limiting ourselves now to the hard rather than to the soft tissues.

G. A. Conn, Philadelphia, Pennsylvania: I notice in Dr. Skillen's pictures that none of the roots had canalicular appearances—so-called hypercementosis of the root. Also that Dr. Skillen found absolutely no complete calcification. I would like to ask Dr. Skillen if, in the case of hypercementosis, there was not complete calcification of the foramen, and if these teeth had been treated by the fixation method which has been studied by the Swiss Research Session of which Dr. Hatton spoke.

William G. Skillen: The illustrations did not show you the complete width of the roots. In none of these teeth was there a complete

closure of the foramen even when there was a complete external hypercementosis. As to the treatment of these teeth, we do not know anything about it, which was the point we wanted make. The treatment being unknown in those cases which come into the hands of the man from the outside and being unable to trace the histories, we feel that they are the most important cases of which to determine the status.

Weston A. Price, Cleveland Ohio: Would you suggest, therefore, that we use our own clinical mistakes for our experimentation?

William G. Skillen: I do not think that I would.

E. E. Haverstock, St. Louis, Missouri: I would like to ask Dr. Skillen if he has discovered the stimulus which cause the deposit of this cement.

William G. Skillen: No, I have not. Again, possibly the answer to that will lie in the soft tissues. You can, of course, presume that it is only an inflammatory reaction.

A. B. Crane, Washington, D. C.: I would like to ask Dr. Skillen if he has had any means of checking in these cases the amount of this deposit which might have been present at the time the pulp canal was entered.

William G. Skillen: I mentioned that we made a comparative check of teeth affected with caries and teeth affected with pyorrhea. Usually, in those 100 cases so checked, the type of secondary deposit was of a tubular nature and not so very extensive. There were also nodular and tumor arrangements, and so forth. I think you have a sufficient check when you note the relations of your deposits to the contents in the canal. If that deposit is not found above the position of the soft tissue, if it is not found where root filling only is found, then you can safely decide what amount of it was caused by the filling or treatment.

W. Clyde Davis, Milford, Delaware: My findings have been limited to the examination of teeth from about 200 patients. Sections were made mostly from cases which were unintentional, with a lesser number following intentional partial pulpectomy. In Nebraska I have over 400 cases of intentional partial pulpectomy. Quite a number think that this harks back to the Egyptian dentistry—pulp mummification—in which one of the things originating primarily is the death of the pulp. The pulp must remain vital, else further interest in the subject is lost. It is the intent to follow out those cases wherein the pulp has not been overwhelmed with arsenic or strong drugs, and has been left as near normal as possible. I receive many letters requesting formulae for some drug or dressing which may be applied to preserve the pulp. If any dressing is used following the operation of partial pulpectomy, it must be bland. It is impossible to manufacture anything at the present time which, if placed on the pulp, will preserve it. Another point made in the paper relates to the closing of the foramina. I have but one case that is uncertain on that point. Under the microscope, with all of the other cases, it is very clearly shown that the foramina are not closed. The deposit of calcic matter is limited to the canals. I do not find the foramina closed except in cases in which there is an inflammation of the periodontal membrane. The percentage (10 per cent) of completely filled canals, accounts of which I have published, was figured from about 200 cases examined. The majority were completely closed for a short distance below the root filling. I have not seen a case wherein the foramina were closed, whereas the canal has been closed to within a very short distance from and just under the coronal portion. A short time ago, one of our investigators made the statement that "we must remove all of the pulp tissue to hope for success." It is impossible to take out all of the pulp from the floor of the pulp chamber to the several foramina. If we cannot take it out what may we do? I shall be very much interested in the results of the study to note the changes in the soft tissue. I think the study to be made will result in showing the changes to be similar to those in connective tissues and other parts of the body as the result of trauma.

I hope one will not get the idea that this has any relation to pulp mummification. In Europe there seems to be an idea that this has reference to the cutting off of the pulp, and putting something on the stump end to preserve it. Such cases are by no means the criterion. We have no history of that which has taken place. Dentists may have applied arsenic. We do not have a line on the operation that should be done.

DENTAL CARIES IN THE LIGHT OF PRESENT-DAY KNOWLEDGE OF DIET AND NUTRITION

By WALLACE SECCOMBE, D.D.S., F.A.C.D., Toronto, Canada

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

EVEN a cursory glance through the literature of the profession shows how hopelessly at variance appear the views of modern dentists on the most fundamental questions relating to dental disease and the best way to combat it.

One practitioner places his entire confidence in prophylaxis and urges the employment of dental hygienists, while another believes that the road to dental health is by way of the toothbrush and dentifrice. Another claims that dental disease is always caused by a deficiency in the diet, a lack of vitamin; another that there is overingestion of carbohydrate food; while yet another would lay the chief blame on the refinement of foods and the consequent insufficiency of the inorganic salts. There are those who urge for consideration the claims of deranged ductless glands, and those who maintain that the condition of the teeth of the child is largely dependent on the food the prospective mother eats during pregnancy. And this list of the causes of dental disease might be much amplified.

These various views may appear to some to be actually contradictory but they are not necessarily so, and may each be definitely related to the chemico-parasitic theory of dental caries. The notable researches of W. D. Miller stand out the more strikingly as time goes on, and it is our duty not to become impatient with those who endeavor to present a larger conception of dental disease and extend the scope of the various factors which tend toward susceptibility or immunity, but rather endeavor to relate intelligently present-day knowledge of diet and nutrition to the accepted etiology of the diseases of the oral cavity.

The human body is the most wonderful and most complex mechanism known to man, and bodily disease should never be considered as a simple problem. It is always more or less complex, and never more complex than when found in the mouth, so many different factors, both local and systemic, being involved. And under modern methods of living, the normal reserve of the average person is so depleted that any one of many factors may prove to be the proverbial "last straw" to throw the body out of physiologic balance. In one case, the determining factor may be one thing and in another case, quite another, though the process be the same in each case.

Evidence exists of dental disease having attacked the teeth and surrounding tissues of people throughout the centuries. While the present-day prevalency of dental disease is a modern development, a knowledge of the dietetic habits of the peoples of earlier times proves a great

value in studying the complex problem of susceptibility and immunity.

As man's food supply has changed, there have been accompanying changes in the function and structure of his digestive organs. Civilized man today, for instance, would be quite unable to digest such large quantities of animal food as did his early ancestor of the hunting period. The modern Eskimo, in his ability to eat and digest immense quantities of animal food, is somewhat comparable in his present development to that of the early hunter. Similarly, our ancestors of an even earlier period possessed the power to digest coarse vegetable foods, roots, nuts, etc., to an extent quite unknown today.

Later on, the advent of cookery and modern agriculture did away with the necessity for a greatly prolonged mastication of vegetable food, and also added materially to the amount of starch and sugar available as food. In utilizing this additional food supply, man's digestive organs are of necessity adjusting themselves to a greater tolerance for carbohydrate foods.

In other words, as man's diet has changed throughout the centuries, there have been accompanying changes in the function and structure of his digestive organs, and these evolutionary changes have had a marked effect on his teeth, jaws, salivary glands and entire alimentary tract.

The present difficulty is that modern refinement, manufacture, storage, refrigeration and control of foodstuffs have resulted in such rapid and artificial changes in the food of the people that the digestive organs have been unable within the time to adjust themselves to these changes.

Speculators have been quick to seize on opportunities that present for making money at the expense of the pockets and health of the people, and the whole question has become such a menace to health that public opinion will doubtless force such government action as shall prevent speculation in foods. Refrigeration is a blessing in the prevention of waste, but a curse when used for the storage of foods for purposes of speculation. Under such a system, when the food is ultimately taken out of storage, its essential food values are in inverse ratio to its increase in price. In the interests of public health, these methods should be discouraged by closely limiting the possible profit on such transactions.

Wonderful as is the power of the human body to adjust itself to changed conditions, it is questionable whether it could, in centuries, or ever, adjust itself to the modern, denatured, devitalized, demineralized and highly refined foods, for many of them are utterly lacking in absolutely essential elements.

Evolution, with the survival of the fittest, is always a painful process, accompanied, as it is, by disease and death. The work of the medical and dental professions is to hold the lamp of knowledge high, that the beams of light may be shed across the pathway of humanity, helping the human race back to simpler living and the practice of the fundamental laws of health.

Nature may be depended on to make every effort to maintain physiologic balance (health) in spite of wrong habits of living. Her task, however, under present conditions, is too great, and we must, as a profession, assist in the education of the public in the laws of health, and particularly as these laws affect the oral cavity.

Mouth health cannot be considered as something apart from general health. The teeth are served by the same blood and nervous system as are the other parts of the body. General health affects

mouth health just as dental disease may cause disease in other parts of the body. The laws of health must be obeyed, and particularly habits of diet, if dental disease is to be prevented.

The subject of diet and nutrition is, of course, of universal interest from the general standpoint of health, but the dentist has a much greater concern in the subject than that, because it has been shown that modern diet is closely related to the increased incidence of dental disease. Almost every phase of the subject of diet has been presented to the dental profession during the last few years. Indeed, so much has been said and written on the subject that one wonders just how much of it all has been digested and assimilated by the average practitioner.

Within the narrow limits of this paper, it is my intention to discuss in detail only one of the factors which enter into the problem of susceptibility to dental caries. I have selected sugar, because my experience leads me to believe that its immoderate use is the predisposing cause of dental caries in fully 50 per cent of cases. Of all the factors involved, I believe sugar to be the most frequent determining cause of dental caries.

Now, what is dental caries? Dental caries may be described as a disturbance of physiologic balance in the oral cavity, resulting in the destruction of the hard tissues of a tooth, the disturbance of balance being both physical and chemical.

On the physical side, there is an interference with the free flow of saliva over the surface of the tooth (salivary stasis) occasioned either by (1) a fatty mucinous deposit (plaque or film) or by (2) capillary force. On the chemical side, within this area of salivary stasis, sugar is retained. Bacterial fermentation of the sugar results in lactic acid produced in contact with the surface of the tooth. Because of salivary stasis, the acid is not diluted or washed way, and the tooth tissue is destroyed through the simple chemical process of the neutralization of the acids of fermentation.

How important, therefore, it is, from the standpoint of preventive dentistry, that salivary stasis be prevented by: (1) normal development and calcification of teeth, anatomic in form and arrangement, with smooth, hard, unbroken surfaces and without capillary spaces; (2) dental operations where necessary to restore and maintain the teeth in health and in anatomic relation and form; (3) normal function of the masticatory machine, for mastication is essential to the cleanliness and health of the mouth, and (4) diet and nutrition such as to maintain the saliva as a thin, watery solution, cleansing and preserving the teeth.

The application of these four principles results in oral health. With an absence of stasis and normal saliva flowing freely in actual contact with the surfaces of the teeth, dental caries could not occur.

Comparatively few mouths are free from areas of salivary stasis. These are the areas of susceptibility, and when more sugar is retained in these areas than there are alkaline salts in the saliva to neutralize the acids of fermentation, caries results.

Facing these fundamental conditions, as practitioners, it is our duty first to eliminate areas of salivary stasis, as far as that may be possible, and then turn our attention to those factors by which chemical balance may be maintained in the mouth, even though a condition of salivary stasis is present.

Chemical balance may be maintained, on the one hand, by increasing the alkaline salts in the saliva through diet, and on the other hand, by reducing the fermentative agent, sugar.

Some few years ago, the view was widely circulated that overingestion of sugar might result in a systemic glycosuria, with an actual overflow of metabolic sugar from the blood to the saliva. This statement, while a most interesting speculation, has not been proved. Analyses of saliva in the form of mouth rinsings show that sugar is not present in normal saliva.

Out of 312 samples examined at the Royal College of Dental Surgeons last session, only two, or less than 1 per cent, showed traces of sugar.

We must conclude that the presence of metabolic sugar in saliva indicates a pathologic rather than a physiologic condition, and assume that the usual source of sugar in the mouth is alimentary in origin, either it being eaten as such, or starchy foods being held in the mouth and converted into sugar by the amylolytic action of the ptyalin.

Of course, immediately after eating sweets or other sugary food, the saliva contains free sugar, but this is very soluble and soon passes off. It is not this sugar that is necessarily involved in dental caries. The sugar involved in caries is the sugar that passes into the areas of salivary stasis, and is retained there.

The more of starchy and sugary foods eaten, the more of these elements are retained in the mouth. The lodgment of a piece of bread or other starchy food debris is not of itself the vital factor, but rather the fact that through its lodgment there is maintained in the mouth a source of supply of sugar as long as the amylolytic action continues. The dissolved sugar passes very freely through the mucinous film or into the capillary space formed by pit, fissure, or faulty contact, and fermentation naturally follows.

The consumption of sugar has grown to such an alarming extent among the English-speaking peoples that we need have no doubt regarding the source of the sugar concerned in dental caries. Indeed, under modern habits of sugar and starch consumption, the supply of alkaline salts in the saliva is quite inadequate to neutralize the acids of fermentation.

The baneful influence of sugar is not alone its local retention in the mouth, but, being an irritant, its presence in strength in the stomach results in a markedly increased flow of mucus, and this in turn results in thick, ropy saliva and a tendency toward formation of films on the teeth. So we have a twofold action of sugar in causing caries; first, in influencing mucinous deposits, causing films on the teeth and, second, in supplying the fermentative agent in the mouth.

Any form of irritation in the digestive tract results in increased flow of mucus. This reaction is Nature's defense. Indigestion, the bolting of food, or sugar or other gastric irritant, always results in thickened, ropy saliva.

Even on the external skin, sugar sets up superficial inflammation, such as that which frequently occurs on the arms of grocers' clerks handling large quantities of sugar. Brandl injected dogs with a 5 per cent solution of sugar and produced a reddening of the mucous membrane, while a 10 per cent solution caused the mucous membrane to turn a dark red, and 20 per cent caused pain and great distress.

Refined sugar, being highly concentrated, should be eaten in great moderation, if at all. I am well aware of the fact that physiologists generally accept the conclusion that sugar used in reasonable amounts is a useful and valuable food. But, how many people use sugar in reasonable amounts and as a food? It is eaten as a condiment to satisfy taste rather than hunger. If taken as a food, the more sugar used, the less of

other foods should be eaten, but the very reverse is the case. Starch should be decreased as sugar is increased, but, in practice, we never put sugar on eggs, cheese or other protein foods, but, rather, on the cereals and starches which are themselves converted into sugar in the body. In other words, sugar, because of its agreeable taste, leads to the ingestion of more carbohydrate food than the system requires.

An ordinary serving of sugar represents as many calories as a medium-sized potato, but, while the one is eaten to satisfy hunger, the other is taken to satisfy taste.

When sugar is used moderately, the whole diet is changed and the appetite perverted. Perhaps the greatest objection to overingestion of sugar is what "comes out" of the diet when sugar "goes in."

It is frequently said that to save the teeth we must start with the grandparents. There is much truth in this statement, and yet we must not overlook the fact that well formed and well calcified teeth frequently decay. That circumstance surely cannot always be blamed on the grandparent. It is easy for one generation to pass responsibility on to another. Let us face the facts. We need not wait for a generation to see the results of a change in diet and in habits of living. The effect is evidenced at once in terms of better health.

May the dental profession, as a branch of the great healing art, play its part in this campaign to increase the health and happiness of the people through preventive dentistry.

Discussion

Harold De W. Cross, Boston, Massachusetts: It is quite possible that systemic conditions may so reduce the resistance of a tooth or a certain part of a tooth as to permit local conditions to become active.

As Dr. Seccombe suggests, disease is very rarely a simple factor, and is usually of a complex nature—especially where the mouth is concerned.

Dentists, as a profession, are prone to believe that all tooth conditions are of local origin, because the type of their education and training has been almost entirely along technical and mechanical lines. The extent and amount of knowledge of physiologic principles and of the manner in which metabolic processes work to produce a normal physical condition or "physiologic balance" in all of the tissues of the body is not sufficient to permit a dentist to give up his technical procedures for an unknown and little understood theoretical practice. The present generation of dentists may be obliged to continue to practice technical dentistry, but along with this they can, if they will, modify the education and training of those following so that they will be able to undertake work which at present is not possible.

Dr. Seccombe refers to the fact that as the food supply of man has changed, so have the structure and function of his digestive organs. This fact is of great importance and adds to the difficulty of modifying our present type of diet. It can be of no advantage to suggest that a person eat foods which cannot be digested and assimilated, but in many instances this is just what would result if a return to a primitive diet should be attempted. Then there are other difficulties, for instance, persons do not want to eat food physiologically suitable, and, even if they are willing to do so, they are unable to find it readily in commercial form.

The fact of the changed functioning of organs referred to and of the surprisingly extensive effect (including nearly every tissue of the organism, eyes, bones and digestive organs as well as the teeth) of slight restrictions of food, (as shown by the work of Howe) especially during certain periods and with upset functioning of various organs, makes it a very doubtful procedure for a dentist to attempt to go into the details of regulating a person's diet except in a very general way.

While undoubtedly man's digestive organs are gradually becoming adjusted to "a greater tolerance" to carbohydrates, physically he is suffering in consequence. Because we are able to pass this excess of carbohydrates through the alimentary tract and continue, apparently, to perform our daily routine of work does not mean that the body is obtaining from these carbohydrates the essential ingredients to build up and maintain "physiologic balance." In other words, while a "tolerance" may be established by readjustments in the functions of the digestive organs, there is no possibility of any adjustment sufficient to permit of physiologic balance unless we believe the organs to have the power, like the philosopher's story of the transmutation

of elements. All living things are made up of certain elements and these elements must be supplied in the right form and quantity in order for the life processes to go on normally.

These changes in function, resulting in increased tolerance for foods which do not supply the proper elements, must be checked promptly, *before* too much adjustment of function has occurred, so that we may change *only* our food and not be obliged to wait for the longer and slower process of a return adjustment of the organs and their functions.

The charge made by Dr. Seccombe on refrigeration of food should elicit interest and action by everyone interested in having good, nourishing food available to the public. However, the demineralization of the principal food supply of man is of just as much or more importance. Bread and cereals—the staff of life—has had a large proportion of its value removed for the same reason that food is refrigerated—to keep it until a "more convenient time" for selling.

We have plenty of laws governing the purity of foods, many being purified until there is nothing left but "purity." It is time we had laws governing the food itself or the physiologic value of foodstuffs.

As Dr. Seccombe intimates, mouth health has usually been considered "apart from general health," just why, it is rather difficult to say, unless it is, as previously intimated, in regard to the dentist's training being so exclusively mechanical that unconsciously he has decided that all tooth troubles must be of a local or mechanical origin, just as is their cure or repair. Had the development of dentistry followed more closely to the science and art of medicine, it is probable that long before the present time tooth diseases would have been considered to have a relation to systemic conditions, as much so as diseases of the eye or ear.

While it is true that it has been shown that diet and the manner of living are practically the only things which have changed to any great extent during the last few generations, and that during the time dental caries has become more prevalent, it is doubtful if we can determine on any one kind of diet or habit of living as being the *single* factor responsible for the present condition of the teeth.

Dr. Seccombe suggests, and probably rightly, that in the line of diet the excessive use of sugar is responsible for a very large proportion of dental caries—whether 50 per cent is too great is not an important matter. It is, however, of great importance whether the action is entirely local or systemic through an excess of carbohydrates in the saliva (metabolic carbohydrate), as this relates directly to any remedial factors which may be employed. If the action is purely local and follows the mastication of carbohydrate substances, then cleaning the teeth should be sufficient to eliminate the retention and fermentation of sugar within any area of salivary stasis and thereby prevent the destruction of the basic elements (calcium and phosphorus) in the tooth—or dental caries (possible combining of sugar with lime).

If, on the other hand, the action is more systemic, consisting of an oversaturation of the fluids of the mouth with carbohydrates, producing a chronic condition in which these fluids are constantly bathing the teeth, no amount of brushing would seem to be sufficient to eliminate this action.

The remedy in this instance is very clearly indicated as a control of the excessive use of carbohydrate foods. Only a *moderate* use of sugar, then, is found to be necessary, whether or not the action is local or systemic. Sugar in excess or between meals destroys the appetite for necessary foods. It replaces real food.

Ninety per cent of decay occurs in occlusal surfaces. Consequently, the most important method of combating caries is by helping to create perfect development of the teeth by prenatal and postnatal diet and hygiene.

THE ESTABLISHMENT OF A MOUTH HYGIENE DIVISION IN STATE DEPARTMENTS OF HEALTH

By TALIAFERRO CLARK, M.D., Washington, D. C.

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THERE is probably no one in the world, outside of the dental profession, who can speak more feelingly on the subject of oral hygiene and prophylaxis than the specialist in child hygiene. We who spend our time in studying various phases of child health know the vast extent of dental defect and the extreme importance of remedial measures in childhood.

Of approximately 2,500 rural school children examined by United States Public Health Service officers, 49.3 per cent had two or more decayed teeth. Among this group of children, 18.3 per cent of the boys and 10.5 per cent of the girls stated that they had never used a toothbrush.

Among 7,579 Florida school children examined in two counties, 16.5 per cent had one or more decayed permanent teeth and 8.9 per cent had two or more decayed permanent teeth. Of the boys, 18 per cent had one or more decayed permanent teeth and of the girls, 14.9 per cent. The highest percentage of decayed permanent teeth was observed among children at 15 years of age in both sexes. Furthermore, of the boys, 40.3 per cent had one or more decayed temporary teeth with the highest percentage at the eighth year; among girls, 45.4 per cent with the highest percentage also at the eighth year.

In a report of a survey made by the North Carolina State Board of Health, it was stated that 80 per cent of the children examined had decayed teeth, 50 per cent of which were first molars.[1] Among a large number of North Carolina children examined, less than 10 per cent of them had ever visited a dentist, and ninety out of every hundred parents had never made any attempt to have the dental defects of their children corrected. It is encouraging to note, however, that in five years of medical and dental inspection of children in the schools of North Carolina, over 100,000 children received free dental treatment.[2]

It is difficult to state just how extensive and far-reaching are the evil effects of dental caries and oral sepsis on the general health.

Uncorrected dental defects and the associated mouth sepsis in children may seriously injure the growth and development of the body. A high percentage of undernourished children show marked

1. Health Bulletin, North Carolina State Board of Health, March, 1921.

2. Cooper, G. M.: Oral Hygiene, Oral Hygiene in North Carolina, reprinted from special Bulletin No. 210, 13:166 (Feb.) 1923.

evidence of dental decay. Defective or aching teeth favor imperfect mastication, and the poison absorbed from decayed teeth and inflamed gum tissues probably affects the child's nutrition. This absorption of septic material may lower the child's vital resistance, thus rendering him more susceptible to the communicable diseases. The experiences (with which you are doubtless all familiar) following the establishment of school dental clinics and dental service certainly seem to indicate a definite relation between mouth defects and the incidence of communicable diseases. It is more than probable that the infected mouth in childhood, unless cared for, carries over into adult life, becoming, it may be, responsible for a share of the degenerative diseases.

Toothache is very frequently assigned as a cause of absence from school, and the afflicted child is in danger of being retarded in his school work. In addition, investigations made by the United States Public Health Service seem to indicate that there is some causal relationship between a septic mouth and slow progress in school.

It would seem quite superfluous to even mention these facts to an audience of dentists, men and women who are authorities in this line. But it *is* necessary in order to show that we outside of the dental profession understand and appreciate the situation. In such an appreciation of the public health significance of oral hygiene lies the very foundation of hearty cooperation between your profession and ours.

When we think of the tremendous amount of work to be done, we realize that it will require the cooperation of all agencies interested in the welfare of the child. All our work must, of course, converge along the three lines leading to a healthy mouth—education, prophylaxis and correction.

Children must be taught how to keep their mouths clean and how to masticate properly. Teachers must be instructed in the principles of oral hygiene so that they will be able to impart this information to their pupils. The prospective mother must be told what foods to include in her diet in order to promote the growth of healthy teeth in her baby. Every mother should know how to feed her children in the way best calculated to insure good teeth in her offspring. She should also understand the necessity for prophylaxis and correction so that she will send her children to the dentist as often as may be required. For we must not forget that all the instruction in the world will not take the place of frequent and careful prophylactic treatments, and the correction of existing dental defects. The dentist and the dental hygienist we must have with us always.

This leads us to a discussion of the various means of bringing this service—educational, prophylactic and corrective—to the large percentage of the population so urgently in need of it. In those states where appreciable advances in this work have been made, one of the following methods has been used: (1) through a separate division established in a state board of health or state board of education; (2) through some agency already established in department of health or education, or (3) through volunteer agencies.

1. *Through a separate division established in a state board of health or a state board of education.*—There are seven states and one territory that have a special division, bureau or similar agency for mouth hygiene work: the states of New York, California, Mississippi, Pennsylvania, Michigan, Tennes-

see and Virginia, and the territory of Hawaii.[3]

Of these special agencies, six are under authority of the state board of health: California, Mississippi, Pennsylvania, Michigan, Tennessee and Virginia. Two are under authority of the board of education: New York and Hawaii. Most of these divisions are under a full-time director.

The scope of the work of these special bureaus includes: (1) promotion of the teaching of oral hygiene; (2) encouragement, standardization and supervision of the installation and conduct of dental clinics, both corrective and prophylactic; (3) investigation of conditions of dental hygiene affecting health of children; (4) dissemination of information relating to mouth hygiene by means of literature, lectures, exhibits, motion pictures and demonstration and (5) advice to public officers, organizations and agencies interested in the health and welfare of children.

The states in this group report the following school dental clinics:

SCHOOL DENTAL CLINICS

	Public funds	Public and volunteer	Volunteer agencies
New York	39	0	21
California	20 (approx.)	9	14 (approx.)
Mississippi	0	0	0 (Estab. 1923)
Pennsylvania	25 (approx.)	0	12 (approx.)
Michigan	0	0	0
Tennessee	9	0	0
Virginia	9	0	0
Hawaii	4	0	1

It should be stated, however, that the number of clinics mentioned here are taken from reports made several months ago. It is quite probable that additional clinics are in operation in these states at the present time. The Mississippi bureau at the time of the report was so newly established that there had scarcely been time for the development of clinics. In Michigan, the state work had not been extended to the public day schools, but was concerned wholly in institutional work.

Nevertheless, the figures quoted give an average of approximately twenty clinics per state where there is a special agency for oral hygiene. This probably does not include large cities, since these usually conduct their own school activities, both mental and physical.

In all of these states, there is some attempt to teach mouth hygiene in the public schools. The measures employed consist of one or more of the following: classroom instruction with graded lessons for the first five grades; practical work and instruction by dentists and dental hygienists; motion picture films, contests, entertainments, lectures; toothbrush drills; charts, literature, drawings, demonstrations; physiology and the "Child's Book of Mouth and Teeth" in the first three grades.

2. *Through some agency already established in departments of health or education.* It must be acknowledged, however, that a separate division of oral hy-

3. U. S. Public Health Service Questionnaire, November, 1922.

giene in the state departments of health or education is not absolutely necessary to the conduct of the best type of oral hygiene practice. Massachusetts is an outstanding example of this truth. In that state, oral hygiene is under the direction of the health instructor in hygiene, who is a member of the division of hygiene of the state department of health. In a questionnaire sent out several months ago, Massachusetts reported 138 school dental clinics, a larger number than was reported by any other state in the union. New Jersey, Illinois, West Virginia, Porto Rico, Wisconsin, North Carolina, Connecticut, New Hampshire and the Philippines are all doing considerable work in this line without a separate division or bureau of mouth hygiene. When supported by public funds, the work is usually under the direction of the bureau of child hygiene, bureau of medical inspection of schools, individual school boards and departments of public instruction, or county boards of health and boards of education jointly.

3. *Through volunteer agencies.*—In many instances excellent work is inaugurated and financed by volunteer agencies. Traveling clinics are in operation in many states, including North Carolina, Pennsylvania, Maryland, California, Minnesota, Michigan, some of the New England states, and others. Some of these are supported by public funds, while others are financed by private agencies. The splendid cooperation of the state dental societies gives the whole dental profession an enviable prestige. The Junior Red Cross, Service Citizens, Junior Children's Aid Society, Public Health Association, and the Anti-Tuberculosis Association have all done their share in promoting a clean mouth.

It is thus seen, from the data at hand, that there are three roads leading to the Rome of our desire—a clean, healthy mouth and sound teeth for every child in the land. The way of our approach will probably vary with conditions in the various states. In some, the broad highway of a separate division or bureau of mouth hygiene leads straight to the goal. In others, it seems wiser and more expedient to use the route of some already established bureau or division. And there are some states where financial and political conditions are such that no way is open except the by-paths of volunteer agencies. But "every day in every way" we are getting nearer the goal.

The United States Public Health Service is so deeply interested in this subject that it has sent the Mouth Hygiene Unit into several states to demonstrate methods of work, to educate the people to the need of this kind of service, and to carry on research. In this way, and by studies and publications, the Service is helping to carry forward an important phase of public health work.

Discussion

A. C. Fones, Bridgeport, Conn.: The significance of the statistics which Dr. Clark has quoted is gradually being understood by educators and laymen, aside from the medical and dental professions. This education of the general public must be continually pursued in order to secure favorable legislation and financial support to further the mouth hygiene movement. As Dr. Clark has shown, the need is so great that we must welcome all available assistance, whether public or volunteer, regardless of our personal belief in the fitness of certain agencies to obtain the best results.

The great impulse of those who view the mouths of the children in our public schools is to establish reparative clinics in order that the damage may be checked and corrected as soon as possible. Although this is an important part of the work and means much to the present generation, it is futile in the long run unless accompanied by a definite health educational program in the public schools for the prevention of dental defects.

The tendency in our profession, as well as the mother profession, medicine, is to con-

centrate on the cure or correction of disease or defects. Although this service will always be necessary, it will not solve the problem of disease, physical defects or dental caries.

I agree with Dr. Clark that state divisions for mouth hygiene are not necessary to the success of local programs, but that when a state division is possible, it can aid materially in the organization of a state-wide program, and in an advisory capacity, in the establishment of local mouth hygiene service. I have a firm conviction, however, that in the event of a state division being possible, it should be incorporated in the state department of education. This is based primarily on the belief that the most urgent need for mouth hygiene exists in the public schools, and that the greatest benefit accrues in the permanent improvement of mouth conditions for the people at large when applied to public school children. This is not to detract from the excellent work that departments of health have done and are still doing; it is only to stress the fact that pernicious mouth conditions should be dealt with in childhood, that these conditions are all preventable, that their prevention is primarily a matter of education, and that, therefore, the public schools become the logical place for an educational program, and that the educational authorities are, therefore, the proper agencies through which to gain access to the public schools, and through which to secure the greatest cooperation and assistance. We must realize that boards of education are the supreme authorities in all matters of education, including all branches of health and hygiene which are carried out in the schools, and that boards of health have access to the public schools for the control of communicable diseases and epidemics only, except by permission of the educational authorities. Such is the legal aspect in Connecticut, and I have been informed that it is true in the majority of states.

It seems, therefore, when public school mouth hygiene service is to be supported by public funds and when conditions are favorable to choose the directing agency, that board of education supervision will make possible the broadest service with the least friction.

Incidentally it is interesting to note the results of a questionnaire distributed by the Bureau of Education, showing that out of 286 dental clinics operating in the schools of the larger cities, 181 were supported and directed by boards of education; thirty-three were supported and directed by city health departments; twenty-two were controlled by these boards jointly, and fifty were supported by the Red Cross and private donations.

PHOTOGRAPHY IN DENTISTRY

By E. H. BRUENING, D.D.S., Omaha, Nebraska

(Read before the National Society of Denture Prosthetists, Los Angeles, California, July, 1922)

THE denture prosthetist must have a camera equipment with which he can make records and comparisons in order to get the best results from his work.

Building a face from a disharmony of features to one of harmony is a most satisfying work, but without the aid of accurate photographs of our case before operating, we cannot demonstrate this change either to ourselves or to our patient. When we show him a picture made before he was operated on and then let him see himself in the mirror, after he has worn his dentures a week or two, he is better satisfied with the results and it helps him to forget some of the discomforts he must undergo in trying to learn to masticate food.

We get a better opportunity to study facial forms and expression when we have in hand a picture with which to make comparisons with photographs made some years ago. These may be of much value in the restoration of features. The length of the upper lip, the depth or prominence of the nasolabial fold and the position of the chin are a few of the important lines that can be better established with the aid of comparative photographs.

Pictures can be made to scale, and by means of a screen changes that have occurred can be readily determined. For instance, in a case of recent extraction, the photographic measurements made before the operation were used to rebuild the face. The following year there were marked changes due to atrophy of tissues. New pictures were made, compared with the first ones and differences noted. New dentures were constructed and the case again photographed. We were able to demonstrate a reconstruction as good as shown by the first pictures.

This most important phase of denture construction has been very much neglected in our concerted effort to find better mechanical methods for setting teeth and making dentures. Now that so much progress has been made along mechanical lines we ought more carefully to consider the esthetic and artistic side of the problem.

To demonstrate the need for this service, one need only look around when he is on the street, in a store or on a street car and he will see examples of misguided or unsuccessful effort to make some man or woman look human, with artificial dentures in his mouth.

The dental office lends itself very readily to photographic work. The natural light is usually very good and the dental chair is satisfactory with the exception of the head rest. Either a tripod or a fixable arm or bracket can be used

for a camera stand. Take a full front view of the case, a sharp profile and a picture of the lips fully distended, exposing the teeth in occlusion.

Special cases will require other views. To eliminate undesirable background have the assistant hold a cloth back of the patient. This should be kept moving during the exposure, which is usually from one to two seconds.

During the year we have had considerable correspondence with the Eastman Kodak Company of Rochester, New York, on the subject of a special equipment for dental purposes. N. B. Hodgson, manager of their medical department, very kindly offered to cooperate with us in finding a satisfactory outfit. The result of this is a part of the exhibit of the Art and Esthetics Committee. This has proved very satisfactory during the short time we have had to try it. It consists of a 5 by 7 view type camera fitted with a Wollensack lens, a tripod, focusing cloth, plate holders and two 300-W. flood lamps and stands. The lamps can be attached to wall brackets where there may not be enough natural light. They have the advantage of always giving the same amount of light from fixed positions, standardizing the length of exposure.

The camera bed is graduated so that it will produce a picture that has a definite relationship to the subject, from natural size down to one-eighth natural size, thus allowing future pictures to be made on the same scale. The machine has a long bellows extension giving good detail in close up work, does excellent copying and gives good results in photographing casts and models.

ATYPICAL NEURALGIAS AND THEIR TREATMENT

By S. L. SILVERMAN, D.D.S., F.A.C.D., Atlanta, Georgia

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

MANY members of the medical and dental professions are wont to look on referred pain as the exception in disease, whereas, to the trained observer, referred pains from remote disorders are rather the rule. Moreover, when referred pains are present, they usually play about the face, jaws and head, although the disorders may be in the upper or lower abdomen. As examples, note the frontal headache due to a constipated bowel. Note, too, the pain in the arms and sometimes in the jaw, due to angina pectoris. Renal colic is characterized by distant reflex pains. The swallowing of a large piece of ice produces a pain located in the frontal bone. This happens when the ice is in the esophagus. The reason for lack of pain definitiveness in abdominal and other deep structures lies in the fact that Nature endowed these structures with little or no sensory nerves, while superficial structures are, if anything, oversupplied, and are therefore well adapted to reflect internal disorders. Thus, the desire to micturate is felt at the urethral meatus rather than at the distended bladder. Sore spots about the abdomen accompanying various acute abdominal infections seem to be located in the skin. An acid stomach will often make the region of the sternum feel sore, and the burning

sensation is located in the throat. Pages can be written enumerating instances of referred pains commonly associated with known disorders.

Though it is usually conceded that tic douloureux is not only the most painful of all neuralgias but also more poignant than any other pain in whatever part of the body, yet those of us who come in contact with the vague and minor types of neuralgias, as well as the major types, have come to look on tic douloureux as a mere bagatelle so far as securing relief is concerned, but dread the minor type of neuralgias on account of lack of success following their treatment.

Everyone of us should recognize, visualize and be able to diagnose the first type that I shall mention, as it is fairly common. It is known as sphenopalatine or Sluder's neuralgia, and is characterized by him practically as follows: a non-excruciating pain in the upper teeth and jaw, sometimes in the lower jaw, about the eye and at the root of the nose, at the temporomandibular joint and in the ear. The pain radiates to the mastoid region, thence to the occiput and neck and downward to the shoulder and even to the arm, hand and fingers. At times the patient will complain of an "aching" throat, but no inflammation is to be discerned. The treatment for this complex syndrome is the injection of the sphenopalatine ganglion with 95 per cent alcohol; since adopting the new injection for the second division through the greater palatine canal, I have been successful in a greater number of these cases.

A second type that is often referred back and forth between the otolaryngologist and the dentist is a nonexcruciating frontal, malar and parietal pain (less often, occipital), and it is in this type that a 35 per cent solution of cantharides in a saturated magnesium sulphate-glycerin combination instilled into the ear has been found effective. The discovery was accidently made by J. D. Thompson, an otolaryngologist of Atlanta, who, having made this application for a patient suffering from otitis media, noticed that the atypical neuralgia that had been present previously suddenly stopped. The prescription for this preparation is as follows:

35% filtered tinct. cantharides.....dr. iv
Magnesium sulphate .....oz. ii
Glycerin .....oz. i
(After this is in solution for five days it is ready for use.)

I have noticed several cases in which material benefit, if not entire cessation of pain, resulted following its use. The technic is simply this: Three or four drops are placed into the ear, and a piece of cotton is saturated with the solution and placed as near the drum as possible. The patient lies on the opposite side. Relief often occurs within thirty minutes. We are at loss to explain how this affects the neuralgia, as no hyperemia is to be noticed. Hygroscopic explanation is not sufficient. The result may, however, be due to the proximity of the sensory branch of the seventh cranial nerve, referred to as the intermediate nerve.

Still a third type that will baffle all of us is the case in which the patient complains of a tingling or burning in the tongue (less often in the palate) and sore salivary glands, and insists on pointing to some edentulous portion of the jaw, piteously complaining that that spot "hurts like toothache." F. Foster Flagg no doubt had this type in mind when he referred to it as phantom odontalgia. Unfortunately, unless we can find some traumatic injury due to extraction, and a consequent healing of some nerve too near the surface, we shall often fail to help the type here described. The iodids and salvarsan, however, whether or not the Wassermann is positive, will at times clear up these cases. At this point I will remind my readers that not infrequently is this disturbance noticed in women about middle age and past. The significance

is plain. During the menopause almost any disorder is likely to assert itself, especially of the reflex or referred type. When we realize that the unpleasant transitions accompanying the menopause usually last about two or three years, it is really a wonder that less neuralgias, joint troubles and mental derangements are not more often recognized. I have, however, noticed that when the change in life is complete, these neuralgic manifestations disappear as mysteriously as they came. Too much surgery has been done for this type, without benefit, including the once popular operation for the removal of the ovaries; the Gasserian operations have also been performed, without benefit. And we must desist from any surgical procedures in our field unless fully warranted, remembering that when this cycle is complete, a spontaneous recovery is more than likely to assert itself.

I have left the fourth and last type for final consideration because our results in treating this type are most gratifying. This type is characterized by sharp, severe pains that radiate, like tic douloureux, often playing around the region of the temple, though not invariably the pains are evoked by partaking of cold or hot drinks. (In this respect it differs from dying pulp, in that with dying pulp, hot applications provoke pain, while cold applications soothe it.) This type is never present in edentulous patients; in fact, it depends on the presence of teeth to assert itself. I refer to pulp nodules and exposed dentin at the gingival margin. Another cause for these severe pains is one that I have never seen referred to in dental literature, and I present it here for consideration. I refer to finely split or cracked teeth—cracks so fine that the radiograph will hardly find them. A good direct light, with sometimes the improved mouth lamp, and an attentive eye will locate these fine cracks, no doubt caused by some trauma, including traumatic occlusion. Relieving the occlusion suffices in the early stages, but as is the case with pulp nodules, the case of long standing must be treated either by pulp removal or by tooth extraction. I assume that the picture in your mind of what I call a finely or slightly cracked crown of a tooth is not one where the broken portion of the tooth is hanging by the periodontal membrane. Differential diagnosis will rule out this type of fractured tooth.

If we bear in mind these probable findings and diligently search for them, I venture to say that the number of patients that are buffeted between physician and dentist and who are looked on as chronic and groundless complainers would materially be decreased.

In conclusion, let it not be construed that I have an unfailing remedy for neuralgic disturbances of whatever kind, because, as I have pointed out in a previous paper, there are types of neuralgias that are apparently relieved only by time and death. But this observation does not apply to tic douloureux and to at least three types of the minor neuralgias I have just mentioned.

The Journal of the American Dental Association

5 North Wabash Avenue, Chicago, Illinois.

Please send in promptly notice of change of address, giving both old and new. Important information regarding subscription price, etc., will be found in the advertising pages.

Editorial

THE HOUSE OF DELEGATES

It is quite probable that the rank and file of our membership do not fully realize the importance of the functions of the House of Delegates of the American Dental Association. Consisting approximately of 200 members, it is charged with the responsibility of conducting the business and directing the policies of the entire membership of 34,000. It therefore goes without saying that its personnel is a matter of considerable importance, and this fact should be imprinted on the consciousness of the members of the various state organizations who elect these delegates. There are certain qualifications which should constitute eligibility for the high office of delegate, and these qualifications should be carefully considered by the state societies.

A man should not be elected merely because he is a "good fellow" or has a political pull. What the delegate most needs is calm deliberation, an analytic mind, faithfulness to duty and some years of experience in dental society affairs. Each state society should seek to impress on its delegates the seriousness of their obligation, and every delegate should study the Constitution and Administrative By-Laws of the American Dental Association before he goes to the meetings, and familiarize himself with the machinery of the organization.

The conservation of time in the meetings of the House of Delegates is a very important consideration where so much business must be conducted, and the delegates should go to the meeting with a full realization of this fact; but, on the other hand, no measure of far-reaching effect should be rushed through without due deliberation and patient consideration. The business of the American Dental Association has assumed such proportions that it requires the combined wisdom

of a large group of men to conduct it properly, and every delegate should enter upon his duties with a full realization of his obligation to the organization.

Most of the state societies will hold their meetings in the next few months, and it is strongly urged that in the selection of their delegates they have in mind those cardinal qualities which make most surely for efficiency and stability in the parent organization. This Association has grown in such a wonderful way that it challenges the admiration of the whole dental world, and if this distinction is to be maintained, it can only be through the medium of its most integral part—the House of Delegates.

AMERICAN ASSOCIATION OF DENTAL SCHOOLS

This newly fledged organization held its first annual meeting in Chicago, March 5, 6 and 7, 1924. It was a splendid success in every way. It will be recalled that this association was consummated at Omaha, Nebraska, in January, 1923, by an amalgamation of the four bodies known as the Canadian Dental Faculties Association, the American Institute of Dental Teachers, the National Association of Dental Faculties and the Dental Faculties Association of American Universities.

It is quite evident that the old adage "In union is strength" is true, because no one meeting of any of the original organizations had ever brought together such a representative body of men as assembled at the initial meeting of the new association. The program was varied and extensive, and in it were represented some of the ablest men in dentistry. The interest was sustained throughout, and it is safe to assume that those who attended went away with a broadened vision of the possibilities of dental education in the future.

We predict for this organization a wide field of usefulness. It combines all the essential advantages of the old organizations, and tends to eliminate many of the cross purposes which had almost imperceptibly crept into them. If the first meeting may be taken as an indication of what is to follow, we may confidently look forward with the keenest anticipation to a development of the dental educational problem, which up to this time has never been approached.

The proceedings of this meeting are to be published in *The Journal of the American Dental Association,* and when they appear, they will furnish much food for thought on the part of every dentist who is in any way interested in dental education.

The officers and executive committee for the ensuing year are as follows: president, Marcus L. Ward, Ann Arbor, Mich.; president-elect, A. W. Thornton, Montreal, Canada; vice president, H. E. Friesell, Pittsburgh, Pa., and secretary-treasurer, DeLos L. Hill, Atlanta, Ga. Other members of the executive committee are W. H. G. Logan, Chicago, Ill.; Lewis E. Ford, Los Angeles, Calif., and R. Boyd Bogle, Nashville, Tenn.

"MATTERS OF PRINCIPLE"

When a man tells you that it is a matter of principle with him to do such and such a thing, you usually find that he is trying to justify an act of a somewhat ungenerous character—such as entering a complaint against someone for discourtesy or neglect, or exacting the fulfillment of an obligation under harsh conditions, or pointing out with blunt frankness a friend's shortcomings, or refusing to contribute to the aid of a cause or an individual, or declining to make a loan to a friend. Perhaps every one of the acts that he thus justifies needs no justification, and is in itself right and proper in the circumstances; unfortunately, explaining it on the ground of principle is likely to excite a question as to the nature of the principles that govern the person. For they seem to concern his own dignity and importance exclusively, his own rights and convenience—the duty of other people toward him rather than his duty toward other people.

Now the only principles on which a man may well pride himself are those that he somehow shrinks from announcing. It is a matter of principle with all decent people not to lie or cheat or betray, but anyone who called attention to some act of his as illustrating the principles of honesty and decency by which he was guided would be regarded with astonishment and even suspicion. The real "matters of principle" are the inner foundations on which the whole structure of character rests, and people do not talk about them. Whenever we hear anyone say, "It is a matter of principle with me to", and so forth, we may be sure that it isn't any revelation or principle that he is about to give, but merely a side-light on his egotism.—*Youth's Companion,* June, 1923.

A NEW DENTAL REGISTER AND DIRECTORY

It is certainly a pleasure to announce that the well-known firm of R. L. Polk and Company have now in the course of preparation a new edition of their Dental Register and Directory of the United States and Canada. Perhaps no other organization has felt the need of such a work, brought up to date, as the American Dental Association. We are constantly appealed to, by our members and others, for information of one character or another, and we have to reply the best we can. In fact, we have seriously contemplated the publication of a dental directory ourselves, but this means large expenses and an immense amount of labor, and we have neither the facilities nor experience required, such as is possessed by a firm which makes a specialty of this work and publishes about 600 directories of all kinds in all parts of the country. We note that Dr. Louis Ottofy is taking care of the editorial part of the great amount of important and useful material relating to the many dental subjects, and we feel assured that this section is in equally capable hands. The scope of the new work is fully explained on page 386 of this issue.

This number of THE JOURNAL will go to all those who were members of the Indiana State Medical Association during 1923, but the March number will go to only those who have paid their State Association dues for 1924. No more leniency, for the post office department doesn't permit it, and anyway the person who is delinquent in the payment of dues is not entitled to any leniency.—*The Journal of the Indiana State Medical Association,* Feb. 15, 1924.

THE DALLAS MEETING

Sixty-Sixth Annual Session

American Dental Association

To be Held in

DALLAS, TEXAS

November 10, 11, 12, 13, 14, 1924

RUSSIAN RELIEF

AMERICAN DENTAL ASSOCIATION

Arkansas State Dental Society		
*Cash		$ 5.00
California State Dental Society		
*Cash		685.10
Colorado State Dental Society		
*Cash		302.50
Connecticut State Dental Society		
*Cash		400.00
District of Columbia Dental Society		
District of Columbia Dental Society		100.00
Florida State Dental Society		
*Cash		200.00
Georgia State Dental Society		
*Cash		50.00
Illinois State Dental Society		
*Cash		2,104.00
Indiana State Dental Association		
*Cash		233.00
Iowa State Dental Society		
*Cash		110.00
Maryland State Dental Society		
*Cash		$ 5.00
Massachusetts State Dental Society		
*Cash		$ 5.00
Michigan State Dental Society		
*Cash		$ 5.00
Minnesota State Dental Society		
*Cash		20.00
Mississippi State Dental Society		
*Cash		200.00
Missouri State Dental Society		
*Cash		10.00
Navy Dental Corps		
*Cash		2.00
New Jersey State Dental Society		
*Cash		10.00
New York State Dental Society		
*Cash	$ 830.00	
Eastern Association of Graduates of the Angle School of Orthodontia	50.00	
		$ 880.00
North Carolina State Dental Society		
*Cash		300.00
North Dakota State Dental Society		
*Cash		10.00
Ohio State Dental Society		
*Cash	$ 500.00	
L. P. Bethel, Columbus, O.	12.50	
		$ 512.50
Oklahoma State Dental Society		
*Cash		4.00
Pennsylvania State Dental Society		
*Cash	$ 167.00	
Reading Dental Society	50.00	
		$ 217.00
Southern California Dental Society		
*Cash		632.00
South Dakota State Dental Society		
*Cash		11.00
Tennessee State Dental Society		
*Cash	$ 55.50	
Nashville Dental Society	34.50	
		$ 90.00
Texas State Dental Society		
*Cash		214.00
Washington State Dental Society		
*Cash		10.00
West Virginia State Dental Society		
*Cash		2.00
Wisconsin State Dental Society		
*Cash	$ 15.00	
Wisconsin State Dental Society	600.00	
		$ 615.00
Total amount received from state societies		$ 7,944.10
Contributions paid direct to Dr. Aguilar, Madrid, Spain		$ 2,604.00
Total American Dental Association March 15, 1924		$10,548.10

RUSSIAN RELIEF

AMERICAN DENTAL TRADE ASSOCIATION

*Cash	$5,327.00	
Detroit Dental Mfg. Co., Detroit, Michigan	50.00	
Lee S. Smith & Son Mfg. Co., Pittsburgh, Pa.	50.00	
Dental Products Co., Chicago, Ill.	25.00	
Altenburg Dental Supply Co., Portland, Me.	10.00	
		$ 5,462.00

RUSSIAN RELIEF

FOREIGN

*Cash	$ 7.17
Total Collections to March 15, 1924	$16,017.27

JAPANESE RELIEF

AMERICAN DENTAL ASSOCIATION

*Cash		$ 241.50
Truman W. Brophy, Chicago, Ill.:		
To Dr. Chiwaki	$ 150.00	
To Dr. Nakahara	150.00	
To Dr. Sato	150.00	
		$ 450.00

Rochester Dental Society, N. Y.	
H. W. Allen	10.00
John Banks	10.00
M. C. Bradley	10.00
C. L. Brininstool	10.00
S. Roy Bryant	10.00
H. J. Burkhart	10.00
Gerald E. Burns	10.00
Carlos D. Chase	10.00
Lewis H. Gilbert	10.00
Benedict S. Hert	10.00
Paul Jones	10.00
Edward G. Link	10.00
G. C. Lowe	10.00
John T. McIntee	10.00
Albert Sager	10.00
E. L. Schlottman	10.00
W. W. Smith	10.00
Marvin Welcher	10.00
R. H. Wickins	10.00
F. L. Agnew	5.00
T. G. Blatau	5.00
J. H. Carey	5.00
B. F. Clark	5.00
J. Arnold Donavan	5.00
J. E. Dunn	5.00
Chester D. Forkel	5.00
J. A. Gaffney	5.00
Lewis S. Goble	5.00
Bainess A. Goldblatt	5.00
Geo. D. Greenwood	5.00
C. A. Howland	5.00
Edgar F. Lewis	5.00
Howard Lewis	5.00
Chas. G. Lynch	5.00
James V. Maloney	5.00
F. Messerschmitt	5.00
J. L. Middaugh	5.00
C. F. Moll	5.00
G. C. Morshelmer	5.00
Byron Palmer	5.00
Chas. J. Pierce	5.00
F. W. Proseus	5.00
Boyd S. Saunders	5.00
F. J. Shaddock	5.00
Arthur S. Smith	5.00
A. A. Sullivan	5.00
H. A. Thiede	5.00
F. H. Tinsman	5.00
J. L. Weller, Jr.	5.00
S. G. Wheeler	5.00
W. H. Wilson	5.00
Wirt Conklin	3.00
J. T. Hempel	3.00
Geo. P. Marvin	3.00
Harry F. Eckler	2.00
	$ 361.00
Eastern Association of Graduates of the Angle School of Orthodontia, New York	$ 50.00
L. P. Bethel, Columbus, O.	12.50
A. M. Geesey, Uniontown, Pa.	5.00
Yellowstone Dental Society, Billings, Montana	5.00
Total Collections to March 15, 1924	$ 1,125.00

DENTAL INSTRUMENTS, BOOKS, MAGAZINES AND SUPPLIES

*Additional instruments, books, magazines and supplies received:

John Fogg, Philadelphia, Pa. (Instruments).

J. R. Garst, Cuyahoga Falls, O., (Instruments).

Samuel S. Haines, Moorestown, N. J., (Instruments)

Trim Houston, Corsicana, Texas, (Instruments).

A. W. Rogers, Corsicana, Texas, (Instruments).

Harry Ezell, Corsicana, Texas, (Instruments).

A. L. Smith, Corsicana, Texas, (Instruments).

*Itemized list of contributors published in previous issues of THE JOURNAL.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Dental Association, November 10, 11, 12, 13, 14, 1924, Dallas, Texas.

American Medical Association, June 9-13, 1924, Chicago, Illinois.

Canadian Dental Association, August 4-7, 1924, Vancouver, B. C.

Dental Protective Association of the United States, 4:00 p. m., December 15, 1924, Palmer House, Chicago, Illinois.

Federation Dentaire Internationale, August 6, 1924, Luxemburg.

National Association of Dental Examiners, November 10, 11, 1924, Dallas, Texas.

STATE SOCIETIES

National Capital, at Washington, D. C., first Tuesday of every month.

April

Alabama, at Montgomery (8, 9, 10, 11).
Connecticut, at Waterbury (24, 25, 26).
Kansas, at Topeka (28, 29, 30).
Kentucky, at Louisville (7, 8, 9, 10).
Michigan, at Flint (14, 15, 16).
New Jersey, at Trenton (9, 10, 11, 12).
North Carolina, at Raleigh (21, 22, 23).
Oklahoma, at Enid (22, 23, 24, 25).
Virginia, at Norfolk (28, 29, 30).

May

Arkansas, at Ft. Smith (12, 13, 14).
California State, at San Francisco (26, 27, 28, 29).
Illinois, at Springfield (13, 14, 15).
Indiana, at Indianapolis (19, 20, 21, 22).
Iowa, at Des Moines (6, 7, 8).
Maryland, at Baltimore (5, 6, 7).
Massachusetts, at Boston (5, 6, 7, 8, 9).
Mississippi, at Jackson.
Missouri, at Excelsior Springs (26, 27, 28).
Nebraska, at Lincoln (19, 20, 21, 22).
New York, at Binghamton (7, 8, 9, 10).
Pennsylvania, at Pittsburgh (13, 14, 15).
South Dakota, at Huron (1, 2, 3).
Tennessee, at Chattanooga (5, 6, 7).
West Virginia, at Huntington (19, 20, 21).

June

Colorado, at Glenwood Springs (19, 20, 21).
New Hampshire, at The Weirs (18, 19, 20).
North Dakota, at Grand Forks (4, 5, 6).
South Carolina, at Charleston (17-19).
Southern California, at San Diego (24, 25, 26).
Utah, at Salt Lake City (25, 26, 27, 28).
Wyoming, at Cody (16, 17, 18).

July

Wisconsin, at Milwaukee (8, 9, 10).

November

American Dental Association, at Dallas (10, 11, 12, 13, 14).
Arizona, at Phoenix.
Texas, at Dallas (10, 11, 12, 13, 14).

December

Ohio, at Columbus (4, 5, 6).

MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

California, at San Francisco, June 18, and Los Angeles, July 28. Secretary, C. A. Herrick, 133 Geary Street, San Francisco, California.

Connecticut, at Hartford, June 26-28. Recorder, Arthur B. Holmes, 43 Central Avenue, Waterbury, Connecticut.

Indiana, June 9 to 14. Secretary, H. C. McKittrick, 1006 I.O.O.F. Building, Indianapolis, Indiana.

Iowa, at Iowa City, May 26. Secretary C. B. Miller, 726 Fleming Building, Des Moines, Iowa.

Minnesota, at Minneapolis, June 20-28. Secretary, R. B. Wilson, 1133 Lowry Bldg., St. Paul, Minnesota.

New Jersey, at Trenton, June 23. Secretary, John C. Forsyth, 429 E. State St., Trenton, New Jersey.

Texas, at Dallas, June 16-19. Secretary, R. L. Rogers, Amarillo, Texas.

Vermont, at Montpelier, June 30 to July 2. Secretary, Philip E. Mellen, Middlebury, Vermont.

Wyoming, at Powell, June 23-25. Secretary, Thew J. Ice, Lock Box 116, Powell, Wyoming.

INDIANA STATE DENTAL ASSOCIATION

The sixty-sixth annual meeting of the Indiana State Dental Association will be held in the Claypool Hotel, Indianapolis, May 19-22, 1924. All ethical dentists are cordially invited to attend. W. E. Neuenschwander of Ft. Wayne is master of exhibits. For further information write to

A. J. KIMM, *Secretary*,
705 Citizens Bank Bldg., Evansville, Ind.

MASSACHUSETTS DENTAL SOCIETY

The Massachusetts Dental Society extends a cordial invitation to all members of recognized dental societies to attend its sixtieth annual meeting, which will be held at the Copley Plaza Hotel, Boston, May 6-9, 1924. Application for tickets to the teaching clinics may be had by applying to

W. VERNON RYDER, *Secretary*,
175 Newbury Street, Boston, Mass.

PENNSYLVANIA STATE DENTAL SOCIETY

The fifty-sixth annual meeting of the Pennsylvania State Dental Society will be held in Syria Mosque, Pittsburgh, May 13-15, 1924. The program is a very complete one, and includes as essayists E. H. Hatton, Chicago; Percy R. Howe, Boston; Newton G. Thomas, Chicago; E. W. Howard, Des Moines, and Edward T. Tinker, Minneapolis.

All railroads will sell round-trip tickets on the certificate plan, at one and a half the one-way rate. Certificates can be obtained by writing the secretary, A. C. Barclay, Highland Building, Pittsburgh, Pa. A cordial invitation is extended to all member of organized dentistry.

SOUTH CAROLINA STATE DENTAL ASSOCIATION

The fifty-fourth annual convention of the South Carolina State Dental Association will be held at Charleston, June 17-19, 1924. The headquarters will be at the Francis Marion Hotel.

ERNEST C. DYE, *Recording Secretary*,
Greenville, S. C.

CONNECTICUT DENTAL COMMISSION

The Connecticut Dental Commission will meet at Hartford, Conn., June 26-28, 1924, to examine applicants for license to practice dentistry and dental hygiene and to transact any other business proper to come before them. For further information apply to

ARTHUR B. HOLMES, *Recorder*,
43 Central Avenue, Waterbury, Conn.

BOARD OF DENTAL EXAMINERS OF CALIFORNIA

The next examination of the Board of Dental Examiners of California of applicants for a license to practice dentistry in that state will be held in San Francisco, beginning June 18, 1924, to be followed by one in Los Angeles, beginning July 28, 1924.

There will also be an examination for applicants for a license to practice as a dental hygienist, in San Francisco, beginning June 18, 1924.

For further particulars address

C. A. HERRICK, D.D.S., *Secretary*,
133 Geary Street, San Francisco, Calif.

ONTARIO DENTAL ASSOCIATION

The annual convention of the Ontario Dental Association will be held at the King Edward Hotel, Toronto, May 26-29, 1924. An excellent program has been arranged and a record attendance is assured.

FRED J. CONBOY, *President*,
Toronto, Canada.

BOARD OF DENTAL EXAMINERS FOR THE STATE OF WYOMING

The Board of Dental Examiners for the State of Wyoming will hold its next examination for dentists and dental hygienists at Powell, June 23-25, 1924. For further information and application blanks apply to

THEW J. ICE, *Secretary*,
Lock Box 116, Powell, Wyoming.

TEXAS STATE BOARD OF DENTAL EXAMINERS

The Texas State Board of Dental Examiners will hold its next examination at Dallas, June 16-19, 1924. No reciprocity. For information, address

R. L. ROGERS, *Secretary,*
Amarillo, Texas.

MINNESOTA STATE BOARD OF DENTAL EXAMINERS

The next meeting of the Minnesota State Board of Dental Examiners will be held at the University of Minnesota College of Dentistry, Minneapolis, June 20-28, 1924. All applications should be in the hands of the secretary at least ten days before the meeting. For further information address

R. B. WILSON, *Secretary,*
1133 Lowry Bldg., St. Paul, Minn.

MASSACHUSETTS STATE DENTAL SOCIETY

TRANSPORTATION INFORMATION

Boston, Massachusetts, May 5-9, 1924

Reduced rates will be authorized on the certificate plan; that is, fare and one-half rate will be granted, provided 250 tickets (where the one way rate is 67 cents or over) are sold to members or dependent members of their families, and provided all other conditions are carried out. In order that the plan may be successful, everyone is asked to do his part.

Each member should request a certificate, not a receipt, for each ticket purchased, and, on arrival at the meeting, should present his certificate to the Transportation Committee for validation. The validated certificates will be returned to him on Thursday afternoon, May 8.

The reduced fare returning will apply only via the same route as traveled on the going trip, as shown by the certificate.

Limited Trains—Return ticket issued at the reduced fare will not be good on any limited train on which such reduced fare transportation is not honored. Through tickets and certificates should be secured early.

Please remember that 250 certificates must be validated by the Transportation Agent to make the plan a success.

Arrangements have been made with the following lines:

NEW ENGLAND PASSENGER ASSOCIATION—New England States and also stations in state of New York on the lines of Boston and Albany, Boston and Maine, and New York, New Haven and Hartford railroads.

TRUNK LINE ASSOCIATION—New York, New Jersey, Pennsylvania, Delaware, District of Columbia, Virginia and part of West Virginia.

CENTRAL PASSENGER ASSOCIATION—From territory west of Trunk Line Association to and including Chicago and St. Louis, and north of the Ohio River, including Cincinnati, Louisville and Cairo.

WESTERN PASSENGER ASSOCIATION; TRANS-CONTINENTAL PASSENGER ASSOCIATION—From Pacific coast and other far Western territory not covered above.

CANADIAN PASSENGER ASSOCIATION—Will participate in any reduced fares that may be authorized by connecting carriers on business passing through Canada from points in the United States to place of meeting and return.

SOUTHWESTERN PASSENGER ASSOCIATION—Reduction will apply from all points in Kansas and Missouri under jurisdiction of Southwestern Passenger Association.

SOUTHEASTERN PASSENGER ASSOCIATION—"Limited number of passengers expected does not justify the special rate."

W. M. FLYNN
W. HENRY GRANT
J. RUSSELL MCKINON
Transportation Committee.
Massachusetts Dental Society.

MASSACHUSETTS DENTAL HYGIENISTS' ASSOCIATION

The Massachusetts Dental Hygienists' Association will hold its second annual meeting at the Copley Plaza Hotel, Boston, May 7 and 8, 1924, in connection with the Massachusetts State Dental Society meeting.

All dental hygienists in the state are urged to attend, and a cordial invitation is extended to those of other states.

ESTHER B. RUSSELL, *Publicity Committee,*
507 Main Street, Worcester, Mass.

NEW YORK STOMATOLOGICAL SOCIETY

The next meeting of the New York Stomatological Society will be held April 28, 1924, at 3 p. m., in Suite 1442, Aeolian Hall, New York City. F. W. McDonald will present a paper on "The Efficient Practice of Stomatology." Clinics will be held by members following discussion.

ALFRED ASGIS, *President,*
STANLEY SLOCUM, *Secretary,*
597 Fifth Avenue, New York.

THE DENTAL SOCIETY OF THE STATE OF NEW YORK ANNUAL MEETING

The fifty-sixth annual meeting of the Dental Society of the State of New York will be held at Kalurah Temple, Binghamton, N. Y., May 7, 8, 9 and 10, 1924.

A cordial invitation is extended to all ethical practitioners, residents of New York or adjoining states. Admission to all literary meetings and clinics will be upon presentation of cards showing membership in state societies of the American Dental Association.

All literary exercises, clinics and exhibits will be held in Kalurah Temple. Thomas R. Cullen, Oswego, N. Y., is chairman of the exhibits committee, and those desiring space should communicate with him immediately.

The headquarters are at the Hotel Arlington. Hotel reservations should be made direct with the hotel management.

The Executive Council will meet for the transaction of business, Tuesday, May 6, at 3:00 p. m.

TENTATIVE PROGRAM

WEDNESDAY, MAY 7, 1924

10:00 a. m.—Invocation ..... Rev. Dr. Tanner
Address of Welcome ..... Mayor Giles
Address of Welcome, Binghamton Dental Society ..... Leo Brady
10:45 a. m.—Vice president's Response ..... J. W. Canaday
11:00 a. m.—President's Address ..... Charles M. Dunne
11:30 a. m.—Committee reports and scientific research
2:00 p. m.—"Some Fundamentals Advisable in the Construction of Full Dentures" ..... Charles Lane, Detroit, Mich.

Discussion

4:00 p. m.—Report of Insurance Committee
Report of National Relief Association
8:00 p. m.—"An Original Method of Applying Porcelain and Fixed Bridgework and Simplified Jacket Crown Construction" ..... William H. Elliott, Detroit, Mich.

Discussion

THURSDAY, MAY 8, 1924

9:30 a. m.—"Crown and Bridgework and the Manipulation of Inlay Waxes, Investment and Casting Gold" ..... Emory C. Thompson, Warren, Pa.

Discussion

2:00 p. m.—Surgical and progressive clinics
6:30 p. m.—Oral Hygiene Dinner. Prominent speakers on this subject, from various parts of the country, will be heard after dinner.

FRIDAY, MAY 9, 1924

9:30 a. m.—Clinics and demonstrations by the Dental Hygienists' Association of the State of New York, and the Dental Assistants' Society of the State of New York.
2:00 p. m.—"A Further Consideration of Apical Infections" ..... Thomas L. Gilmer, Chicago, Ill.

Discussion

4:00 p. m.—Reports of officers
8:00 p. m.—Presentation of the Jarvie Fellowship Medal
"The Relation of a Healthy Mouth to a Healthy Body" ..... Harvey W. Wiley, Director Bureau of Foods, Sanitation and Health, Washington, D. C.

SATURDAY, MAY 10, 1924

9:30 a. m.—Surgical and table clinics

Honorable Henrik Shipstead, United States Senator from Minnesota, a member of the dental profession, has accepted an invitation to attend the meeting and make an address.

During the time of the meeting of the New York State Dental Society, sessions of the New York State Dental Hygienists' Association and the Dental Assistants' Association will be held.

Every effort is being put forth to make this meeting one of the most attractive in the history of the Society. A cordial invitation is extended to all ethical practitioners. Application has been made to the Trunk Line Association for reduced railroad rates. For further information and programs, address

A. P. BURKHART, *Secretary*,
57 East Genesee Street, Auburn, N. Y.

NATIONAL SOCIETY OF DENTURE PROSTHETISTS

Cleveland, Ohio, Sept. 7, 1923.

To The Executive Council and Members
National Society Denture Prosthetists:

In accordance with your action of September 3, relative to an article published in the August A. D. A. *Journal*, I beg to submit the following:

My attention has been called to the fact that the following paragraphs in an article published in the August issue of the *Journal of the American Dental Association*, page 776, have been misinterpreted and considered by some to be a personal attack to the extent of being slanderous.

I retract every word or inference in the aforesaid article that reflects in any way on the ability and the efforts of the men and their followers who have sincerely labored in an effort to solve the problems of occlusion.

The paragraphs referred to are as follows:

"Articulation itself is a purely physical function. It therefore should not surprise us that previous and present investigators accompanied the presentation of their conception of articulation with a mechanism which incorporates and illustrates their ideas of the subject. I mention the names of Christiensen, Snow, Gysi, Hall, Monson, Needles and Hanau. Scores of men could be added.

"Snow, Gysi and their precursors have laid the foundation upon which I base my work. The conical theory of Dr. Hall, the spherical theory of Dr. Monson, and the theory of the concentric spheres by Dr. Needles were the subject of my attacks in discussions and papers read before various professional societies.

"The three theories last mentioned (Hall, Monson, Needles) should never have been taken seriously, as they are neither scientific nor logical, in spite of their authors' assertions.

"The basic ideas of our present conception of articulation were very ably presented to us by Drs. Snow's and Gysi's theoretical work and ingenious devices, illustrating their conception of the masticatory operation. The Gysi simplex eliminates itself from consideration, as the principles incorporated therein are inconsistent with Dr. Gysi's valuable findings.

"In the study of the work of each investigator, including the above named, you will find that the endeavor was made to design an apparatus which reproduced mandibular movements. Some claimed an exact reproduction of such movement. As a matter of fact, some claimed that their pet mechanism represents that ideal movement which the great Creator seemingly had failed to establish or to preserve in the condylar joint of the unfortunate patient. Other authors and inventors were more modest; they accepted, as universally applicable, those standards which previous masters of art—and of speculation—handed down to us. The most naive of our geniuses had intuitions, molded them in metal, attached a decorative theory unto their accomplishment and—it must be admitted—they found a goodly number of fanatical be-

lievers and blind followers whose mental inertia probably did not care to penetrate even the polish of the nickel-plated instrument under consideration. They are responsible also, in a large measure, for the existing state of ignorance and impotence."

I wish to thank those who have called my attention to this matter, and I trust that this article will be accepted in the spirit in which it was intended.

Respectfully yours,

R. HANAU.

RESOLUTION PASSED BY THE SECOND DISTRICT DENTAL SOCIETY STATE OF NEW YORK

WHEREAS, by a certain bill recently introduced jointly in the Senate and the House of Representatives of the United States and known and designated as Senate Bill Number 1806 and House Bill Number 4444, it is provided that distinction between line and staff officers of the Navy be expunged in so far as pay, rank and opportunity of advancement is concerned and

WHEREAS, heretofore, dental surgeons, physicians and other staff officers of the Navy frequently were compelled to quit the Service in order to earn more adequate compensation and advancement, and only those professional men of independent means could afford to remain in their country's service, and as a natural result the best of medical and dental treatment is not always available to the officers and men of the Navy and

WHEREAS, this organization is utterly opposed to any existing condition that classifies dental surgeons in a rank inferior to other Navy officers, now

Therefore, it is resolved that the Second District Dental Society of Brooklyn, New York, in regular meeting assembled, endorses the aforesaid bill and urges its prompt enactment into a law, and it is further

Resolved, that this resolution be spread at length upon the minutes of this Society and that copies thereof be forwarded immediately to all members of the United States Senate Naval Affairs Committee and the United States House of Representatives Naval Affairs Committee, and to the dental journals.

A NEW DENTAL DIRECTORY

It is certainly gratifying to learn that R. L. Polk & Co., widely known directory publishers, are now compiling and preparing for publication a new edition of the Dental Register and Directory of the United States and Canada. It will fill a long-felt want. The last one, published in 1917, has become obsolete under the tremendous advancement our profession has made of late years. The compilation and management will be under the supervision of the Chicago office of the publishers, in the Rand, McNally Building, 538 S. Clark St., and Dr. Louis Ottofy, generally and favorably known as a dental lexicographer, has charge of the editorial management.

The work will contain names of dentists listed in alphabetical order by states, provinces, cities, towns, etc., in the United States, its insular and noncontiguous possessions; and in Canada according to the provinces and Newfoundland. There is a complete alphabetical list of all the dentists of North America; all dental laws in force, including those most recently enacted; the U. S. Army Dental Corps; lists of dental schools, societies, boards of dental examiners, auxiliary and postgraduate institutions, national and interstate associations, etc.

Vast and important changes have taken place in the dental profession since the material for the last edition was assembled in 1916. The entrance of the United States and Canada in the war has led to an unprecedented development and progress. As one of the results, a considerable increase in the number of dental practitioners has taken place; many changes of location, removals, etc., have also resulted. This naturally means the addition of a large number of names and corrections, and the addition of much useful information pertaining to the present status of the profession.

It is the policy of the publishers to make this new edition not only a directory in the ordinary sense, but also a useful work of reference for all who are in any way directly or indirectly interested in dentistry. Many new features will therefore be added, among them the following: the reciprocity arrangements between the several states; dental research, dental libraries; societies and clubs; dental fraternities; code of ethics; dental insurance, benefit and protective companies; dental societies composed of specialists; the Army Dental Corps in Canada as well as in the United

States; the Navy Dental Corps; industrial dentistry; information pertaining to the field of dental hygiene and preventive dentistry; dental clinics in public and private schools; dental infirmaries; lists of manufacturers and dealers in dental supplies and specialties made for the use of dentists; all recently enacted laws governing the practice of dental hygienists; women's activities in dentistry; associations of dental mechanics and dental assistants; list of dental laboratories; list of the principal dental, medical and allied books and their publishers; number of dentists according to the decennial U. S. Census; number of dentists annually graduated from dental schools; all information obtainable at the time of going to press pertaining to the Seventh International Dental Congress to be held in Philadelphia in 1926, and like additional information of interest to dentists, manufacturers, dealers in dental supplies, and all allied interests.

It is evident that a work of so extensive a scope cannot be made perfect without the cordial cooperation of all who are interested, and it is confidently hoped that the courteous requests for information on the part of the publishers will be met with prompt and cordial response, as in the final analysis it will be those who are interested in this important profession who will be most benefited by a complete and reliable presentation of all data.

NEW BOOKS RECEIVED FOR THE LIBRARY OF THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

The Journal of the American Dental Association promptly acknowledges herewith the receipt of new publications. Books selected from those named on this list are reviewed below. Reviews are matter-of-fact statements of the nature and contents of the publication referred to and are intended *solely to guide possible purchasers.*

Die Behandlung der Sogenannten Alveolarpyorrhoe und der Anderen Paradentosen. Robert Neumann. 171 pages and 246 illustrations. Verlag von Hermann Meusser, Berlin, $3.80.

The Review of Clinical Stomatology. A Monthly Journal Devoted to the Advancement of Knowledge of Disease of the Mouth and Teeth. Edited by Alfred Asgis, D.D.S., New York, and Geo. W. Mackenzie, M.D., Philadelphia, Supplement to The Journal of Opthalmology, Otology and Laryngology. 640 Madison Avenue, New York, N. Y. Subscription price, $2.00

PATENTS OF INTEREST TO DENTISTS

1421875. Toothbrush, William L. Webster, New York, N. Y.

1421893. Sterilizer for instruments and dressings, Otto Barta, New York, N. Y.

1421911. Tooth-cleaning device, A. B. Cohen, Far Rockaway, N. Y.

1421988. Apparatus for casting fillings for teeth, W. H. Richards, Knoxville, Tenn.

1422044. Mount for artificial teeth, Herbert A. Edwards, London, England.

1422101. Knockdown dental and surgical table, Walter G. Holmes, Minneapolis, Minn.

1422452. Dental plate anchorage, E. H. Lace, Vandergrift, Pa.

1422488. Dental impression tray, Ernest R. Smith, San Francisco, Calif.

1423225. Dental mirror, William E. Knight, Delaware, Ohio.

1423485. Business hours placard, John T. McNiff, Waterbury, Conn.

1423027. Artificial tooth, Joseph E. Rose, Portland, Oregon.

1423288. Dental fastening for removable bridges and partial plates, William L. Withers, Salt Lake City, Utah.

1423921. Mold guide for artificial teeth, Charles J. Duffy, Yonkers, N. Y.

1423924. Adjustable X-ray tube holder, Edwin L. Edwards, Indianapolis, Ind.

1423628. Tube tooth and crown, Amos H. Sibley, Shipbottom, and G. L. Van Allen, Newark, N. J.

1423635. X-ray cabinet and machine, Wm. H. Thwaites, Grand Rapids, Mich.

1424707. Dental instrument, Henry A. Adler, New York, N. Y.

1424434. Holder for toothcleaning articles, Herman Ausubel, New York, N. Y.

1424618. Denture reliner, Thomas W. Carey, Jr., New Orleans, La.

1424243. Dispensing tube and closure therefor and joining same, Frederick L. Fox, Washington, D. C.

1424406. Stamp for thin sheet metal plates such as dental plates and the like, Friedrich Hauptmeyer, Essen, Germany.

1424321. Button for removable fixing the suction disk of a set of teeth, Erich A. Schmerel, Leipzig, Germany.

1424595. Casting machine, P. E. Schwarz and T. D. Salmon, Philadelphia, Pa.

Copies of above patents may be obtained for 25 cents each, by addressing John A. Saul, Solicitor of Patents, Fendall Building, Washington, D. C.

The Sword That Cuts Distribution Costs

By ERNEST V. MADISON

We have learned how to make a greater quantity of an article to fill an increasing demand.

We have learned how to make articles at a lower cost without deteriorating their quality.

Meanwhile, our costs of distribution through the sales-man-to-jobber-to-dealer (or agent) method have not been proportionately lowered. Any reduced costs in traveling facilities have been offset by increased salaries and the higher standard of living and appearance necessary for the salesman to maintain.

The progress that has been made in reducing the cost of distribution has been through a more widespread use of advertising.

As this use of advertising is extended still further it is but natural that a far greater proportion of the preliminary work of the salesman will have been accomplished even before his first call. The salesman, then, can spend his time in actual selling instead of dividing it among "missionary," introductory, educational, demonstration and entertainment duties. He can cover more territory as a consequence. The annual cost of distribution now charged to sales expense will be lowered.

Such a reduction will apply to the consumer's benefit—and when we speak of the consumer we include ourselves—for every man is a consumer of the articles he does not manufacture. In time it will mean a tremendous annual saving.

Advertising is the sword with which the manufacturer must cut distribution costs.

It is up to us to search out those manufacturers who are wielding this sword. And where we see a group of such manufacturers, as are found in this issue of the Journal of American Dental Association, it is well that we encourage them with our patronage.